DEVELOPING SUSTAINABILITY INDEX OF MICROFINANCE INSTITUTIONS IN PAKISTAN

By

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ABSTRACT

Despite the importance of sustainable microfinance institutions (MFIs) in alleviating poverty, the measurement of sustainability is still under debate. This study aims to develop an index that measures the sustainability of MFIs in Pakistan based on a double bottom line approach. Principal Component Analysis (PCA) is employed to assign weights to individual indicators that are further used to compute the sustainability score of MFIs in Pakistan for the period 2006-2015. The weights assigned to individual indicators of financial self-sufficiency (FSS), operational self-sufficiency (OSS), average loan balance per borrower (ALPB) and a number of active borrowers (NAB) are 0.6643, 0.6607, -0.1905 and 0.2931 respectively. The positive values for weights indicate that any increase in FSS, OSS, and NAB will cause incremental sustainability scores of MFIs, whereas, an increase in ALPB will cause a reduction in sustainability scores of MFIs. The determinants of sustainability are also identified using Fixed Effect Regression. Results suggest that return on asset (ROA), return on equity (ROE), borrower per staff member (BPSM) and gross loan portfolio (GLP) have a significant effect on the sustainability of MFIs. Results found in the moderated model, using age and size as proxies of life cycle theory, further suggest that age significantly moderates the relationship between ROE, portfolio at risk greater than 30 days (PAR>30), BPSM, debt to equity ratio (DER), GLP and sustainability of MFIs. Moreover, size significantly moderates the relationship between ROA, BPSM, and sustainability of MFIs. A composite measure of sustainability developed in this study is helpful for managers to evaluate MFIs in pursuit of their efforts to achieve the double bottom line. Findings further suggest that over the life cycle of MFIs, managers need to mainly focus on ROA, ROE, and BPSM, along with PAR>30, DER and GLP to attain sustainability.

Keywords: microfinance, financial sustainability, double bottom line, life cycle, Pakistan

ABSTRAK

Di sebalik kepentingan institusi kewangan mikro (MFIs) yang mampan dalam mengurangkan kemiskinan, pengukuran kemampanan masih dalam perdebatan. Kajian ini bertujuan untuk membangunkan indeks yang mengukur kemampanan MFIs di Pakistan berdasarkan pendekatan garis bawah berganda. Analisis Komponen Utama (PCA) telah digunakan untuk memberi tumpuan kepada indikator individu dan selanjutnya digunakan untuk mengira skor kemampanan MFIs di Pakistan bagi tempoh 2006-2015. Pemberat yang diberikan terhadap kecukupan kewangan (FSS), kecekapan operasi (OSS), purata baki pinjaman per peminjam (ALPB) dan bilangan peminjam aktif (NAB) masing-masing adalah 0.6643, 0.6607, -0.1905 dan 0.2931. Nilai positif bagi pemberat menunjukkan bahawa sebarang kenaikan dalam FSS, OSS, dan NAB akan menyebabkan peningkatan skor kemampanan MFIs, manakala peningkatan dalam ALPB akan menyebabkan pengurangan skor kemampanan MFIs. Selain itu, penentu kemampanan dikenal pasti menggunakan Regresi Kesan Tetap. Keputusan menunjukkan bahawa pulangan atas aset (ROA), pulangan ke atas ekuiti (ROE), jumlah peminjam bagi setiap kakitangan (BPSM) dan portfolio pinjaman kasar (GLP) mempunyai kesan yang signifikan ke atas kemampanan MFIs. Dalam model perantara, dengan menggunakan umur dan saiz sebagai proksi teori kitaran hayat, keputusan lanjut menunjukkan bahawa usia secara signifikan menyederhanakan hubungan antara ROE, portfolio berisiko lebih daripada 30 hari (PAR> 30), BPSM, nisbah hutang terhadap ekuiti (DER), GLP dan kemampanan MFIs. Selain itu, saiz secara signifikan menyederhanakan hubungan antara ROA, BPSM dan kemampanan MFIs. Pengukuran komposit bagi kemampanan yang dibangunkan dalam kajian ini boleh membantu para pengurus untuk menilai MFIs dalam usaha mereka untuk mencapai garisan bawah berganda. Dapatan seterusnya mencadangkan bahawa sepanjang kitaran hayat MFIs, pengurus perlu memberi tumpuan utama kepada ROA, ROE dan BPSM, bersama dengan PAR> 30, DER dan GLP untuk mencapai kemampanan.

Kata kunci: pembiayaan mikro, kemampanan kewangan, garis bawah berganda, kitaran hayat, Pakistan

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LIST OF ABBREVIATIONS

ALPB	Average Loan Balance per Borrower
BOO	Breadth of Outreach
BPSM	Borrowers per Staff Member
CGAP	Consultative Group to Assist Poor
DER	Debt to Equity Ratio
DOO	Depth of Outreach
FS	Financial Sustainability
FSS	Financial Self-sufficiency
GLP	Gross Loan Portfolio
LCT	Life Cycle Theory
MBB	Micro Banking Bulletin
MFIs	Microfinance Institutions
MIX	Microfinance Information Exchange
NAB	Number of Active Borrower
OER	Operating Expense Ratio
OSS	Operational Self-sufficiency
PAR>30	Portfolio at Risk Greater than 30 Days
PMN	Pakistan Microfinance Network
ROA	Return on Asset
ROE	Return on Equity
RSP	Rural Support Program
SDI	Subsidy Dependence Index
SI	Sustainability Index

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Microfinance institutions (MFIs) are the key credit providers to poor people, lacking collateral, in developing countries. These institutions provide facilities including credit, insurance and deposit accounts (Quayes, 2015; Tehulu, 2013). Thus, microfinance by empowering poor is a concept of poverty reduction (Manos & Yaron, 2009; Rahman & Luo, 2011).

Since the inception of civilization, humanity is facing and fighting against poverty. Poverty remains a reality in most developing countries and witnessing a lack of economic diversity, income inequality, and poor governance are among the root causes (Abdulai & Tewari, 2017). Also, poverty also arises due to the limited availability of finance to poor people (Tehulu, 2013). Access to finance could expand opportunities for all and stability in the financial system tends to promote efficient savings and investment that help an economy grow and reduce poverty gap (Beck *et al.*, 2008). According to the Consultative Group to Assist Poor (CGAP), poverty may be reduced if poor people are given financial facilities including loans, fund savings and transfer, and insurance (CGAP, 2004).

However, financing poor people has remained a major concern globally due to failures associated with formal credit markets (Hulme & Mosley, 1996), the high repayment risks and general lack of acceptable collateral. It has therefore contributed to excluding poor

people from accessing financial services (Hermes & Lensink, 2007). Thus, microfinance has been considered as a flexible solution to overcome poverty (Rahman & Mazlan, 2014c; Syedah *et al.*, 2013).

Microfinance institutions have grown rapidly in recent years in terms of the number of people targeted (Awaworyi Churchill & Nuhu, 2016). Worldwide, the microfinance industry has experienced record growth in the year 2004 to 2008 (Yimga, 2015) and MFIs loan portfolio annual growth rate increased by 34 percent. According to the Microcredit Summit Campaign, in 2007, MFIs client portfolio reached 155 million all over the world (as cited by Yimga, 2015). Gonzalez (2010) estimated that from the year 2004-2008, the number of MFIs borrowers have increased at an average of 21 percent per annum. Despite the rapid growth, the World Bank's Global Financial Inclusion Database 2014 reported that still, 2.5 billion poor people worldwide were unable to access any financial institution (Dey, 2015).

In comparison to the other regions, MFIs in South Asia region have also seen massive growth in reaching the number of poor clients. As per the data reported in 2014, MFIs in South Asia Region[1] have a total of 54 million borrowers with a gross loan portfolio (GLP) of USD 12.3 billion[2]. However, South Asia still accounts for the second highest poverty rate that is significantly higher than those of East Asia and the Pacific, Eastern Europe,

[1] South Asia region: countries including Pakistan, India, Bhutan, Bangladesh, Nepal, Sri Lanka and Afghanistan

[2] www.mixmarket.org

Central Asia, the Middle East, and North America. Also, the World bank database reported that South Asia accommodated 33.4% of global income poor by 2013 (Ravindra, 2018).

Pakistan has a large population of almost 200 million with 44% of people below the poverty line having an income of less than $2 per day (Global Monitoring Report, 2015). In Pakistan, "Poverty is increasing due to low GDP and inequality. It is the responsibility of the state to eradicate poverty. As long as the country will not be free of poverty, it cannot be fully functioned on the way to progress" (Pakistan Microfinance Network, 2017, p. 11).

The government of Pakistan took several initiatives to eradicate poverty including the establishment of microfinance institutions. The first microfinance program initiated by the government of Pakistan in 1953 was through village AID package, in the form of a five-year plan that was later abandoned in 1962 after the establishment of Agriculture Development Bank. Agriculture Development Bank (now known as Zarai Taraqiati Bank) was established in 1961 to overcome poverty by giving subsidized funds and small loans to the farmers (Farooq & Khan, 2014; Rauf & Mahmood, 2009). Later, during the decades of the 1980s and 1990s, several rural support programs were also started by the government to overcome the poverty level through subsidized funds. These include Orangi Pilot Project (1987), Agha Khan Rural Support Program (RSP) (currently, known as First Microfinance Bank), National RSP(1991) and Sarhad RSP (1989) (Ahmad, 2011). Under the development program for the microfinance sector, Khushali Bank in the year 2000 was the pioneer MFI in Pakistan to provide subsidized loans and credits to the poor (Rauf & Mahmood, 2009).

According to Rauf and Mahmood (2009) Pakistan Microfinance Network (PMN), a representation of developing MFIs was established in 1998. After two years, the Pakistan Poverty Alleviation Fund was initiated in 2000 to promote the MFIs wholesale refinancing. Currently, it refinances microloans to almost 56 percent of PMN members with a loan amount of USD 175.2 million (PKR 10,513 million) and an outstanding loan portfolio of USD 66.9 million (PKR 4,013 million) (Shirazi & Khan, 2009). Moreover, the Agriculture Development Bank has established a new loan fund of USD 15 million to assist newly licensed Pakistani MFIs at district and provincial level. State Bank of Pakistan has set up a guarantee facility of 10 million pounds, with UK Department of International Development, to assist development financial institutions and banks in facilitating MFIs to avail credits for an increase in outreach (State, 2008).

Despite the high priority placed on microfinance interventions by both national and international development agencies as a means of alleviating poverty, the performance of MFIs in terms of financial sustainability (FS) and outreach is increasingly being questioned by various authors (Abdulai & Tewari, 2017; Cull & Morduch, 2007). The fundamental question is on whether MFIs could reach the largest number of very poor people (outreach) while at the same time maintain its FS (Rahman *et al.*, 2015).

The "Institutionist" and "Welfarist" approaches in microfinance literature provide two different arguments (Woller *et al.*, 1999). Welfarists emphasize that MFIs core purpose is to alleviate poverty by targeting a maximum number of poor people which may be achieved by using subsidies and financial support from the government. The supporter of the Welfarist approach contends that poor people are unable to afford high interest rates.

Therefore, focusing on being financially sustainable deviates from the goal of reaching a large number of poor borrowers.

This gives rise to another debate where researchers argued that the increase in a shift of MFIs towards profitability and FS leads to "Mission Drift," where MFIs focus on the increase in wealthier clients instead of poor borrowers (Armendáriz & Szafarz, 2011; Hishigsuren, 2007). According to Woller *et al.* (1999) and Woller (2002), when MFIs ignore the poor customer segment, mission drift occurs. Additionally, Schreiner (2002) argued that mission drift weakens the outreach to the poor.

On the flip side, Institutionist approach refers to focusing mainly on the FS by being subsidy independent and then reaching the poor people (Epstein & Yuthas, 2010). This approach emphasizes to reduce the cost of operations and yield revenues out of its loan portfolio. Institutionist claim that empirical evidence does not support the negative effect of interest rate on the poor borrowers. Additionally, they claim for the non-existence of the negative relationship between FS and client's poverty level (Hermes & Lensink, 2011). This argument is supported by the view that outreach to a large number of poor people regularly, in the long run, is not possible if MFIs are not sustainable financially. The debate seems to settle in favor of Institutionist approach (Hermes & Lensink, 2011).

Existing literature on microfinance does not support the unified emergence of mission drift. Non-existence of mission drift is supported by empirical studies of Gonzalez-Vega *et al.* (1996) and Mersland and Strøm (2010) which shows that outreach depth is not reduced due to commercialization of BANCOSOL in Bolivia. Additionally, Rhyne (1998)

supported that commercialized MFIs provide better services to poor customers because the profit-oriented MFIs tend to be more efficient and seek new markets to extend their loan products.

Littlefield *et al.* (2003) find that the efficiency of MFIs in terms of cost per borrower is better for the programs that focus poor customers and support the non-existence of mission drift. Additionally, Fernando (2004) evaluates 39 transformed MFIs and does not find the sign of mission drift. They conclude that the financial position of these MFIs improved without deviating from their mission. Another case study of MFIs in Bangladesh by Hishigsuren (2007) also did not find any statistically significant signs of mission drift.

The above studies highlight that the issue of trade-off does not provide any strong empirical support. Henceforth, MFIs need to focus on achieving FS and outreach together. Thus, MFIs have dual goals; 1) achieving FS and 2) reaching the maximum number of poor people (known as outreach), commonly known as "Double bottom line" (Dunford, 2000; Guntz, 2011). Thus, holistic sustainability may be achieved by being financially sustainable and attaining maximum outreach (Bhanot *et al.*, 2015).

Sustainability of MFIs is crucial as Schreiner (2000) says, "Unsustainable MFIs might help the poor now, but they will not help the poor in future because the MFIs will be gone." This point is further supported by the case of microfinance crisis which hit the state of Andhra Pradesh India in the year 2010. The MFIs in Andhra Pradesh accelerated towards increased outreach but resulted in increasing the debt burden of the borrowers, charged excessive rates on interest and used wrong ways for recovery of loan, eventually leading

to closing down of microfinance operations in the state (Shylendra, 2006). Apart from the development of MFIs in reaching a huge number of poor and capital available to them, MFIs sustainability is still an unresolved issue (Muwamba, 2012; Syedah *et al.*, 2013). Therefore, it is critical to address the issue of MFIs sustainability.

1.2 Problem Statement

Sustainability of MFIs is essential in achieving the poverty reduction goal (Janda & Turbat, 2013; Rahman & Mazlan, 2014a; Tehulu, 2013). Since 44 % of the population in Pakistan is living below the poverty line, therefore sustainable MFIs are critical in reaching these people (Pakistan Microfinance Report, 2015). MFIs sustainability is important not for the institution itself (Hollis & Sweetman, 1998), but also for the overall economy in reducing poverty (Tehulu, 2013). Moreover, MFIs sustainability is also necessary to fulfill needs of stakeholders, serving the maximum number of poor people, controlling the impact of formal lenders, cost management and for the capital generation from other sources (Vinelli, 2002).

Despite the importance of sustainability, Wijesiri *et al.* (2017) highlighted that although several methods are often used, there is no universal agreement on the specification of evaluating and measuring MFIs sustainability. MFIs face the challenge of achieving the dual goal (double bottom-line) (Abdulai & Tewari, 2017), due to the lack of robust measure for sustainability of MFIs (Bhanot *et al.*, 2015). The existing studies on MFIs sustainability use standard accounting ratios based on the financial information obtained from annually audited reports and various data agencies. Therefore, operational self-sufficiency (OSS)

(Rahman & Mazlan, 2014b) and financial self-sufficiency (FSS) (Gibbons & Meehan, 1999) are widely used in measures of financial sustainability.

Wijesiri *et al.* (2017) highlighted the lack of robust measurement for MFIs sustainability. Importantly, their argument revolves around the interpretation of OSS and FSS. OSS measure MFIs ability to cover their expenses using income generated from the operations (Okumu, 2007). However, MFIs are considered sustainable if they are independent of subsidies. Being operational self-sufficient does not provide any detail about income generated from subsidies and deviation of MFIs from reaching the poorest. Additionally, FSS measure MFIs ability to cover its expense from income by remaining independent of subsidies (Christen, 1995). However, Manos and Yaron (2009) and Bhanot *et al.* (2015) revealed disagreement on measuring sustainability through financial measures only, as they lack an indication of poverty alleviation.

Prior literature reveals several indices to determine MFIs sustainability. For instance, Yaron (1992) developed a Subsidy dependence index (SDI) for Asia Rural Financial Institutions led by the World Bank that is used to measure the MFIs dependency on subsidies. This index determines the variation in average lending interest rate to adjust for complete subsidy independence. However, Morduch (1999) and Nanayakkara (2012) argued that dependence on SDI only focuses on the FS of MFI. They argued that increase effort of MFIs to become subsidy independent using SDI might result in higher lending rates and lower outreach. Additionally, Chaves and González Vega (1993) argued that the calculation of SDI is not possible due to the non-availability of the required data.

Bhanot *et al.* (2015) also attempted to construct a sustainability index by using both FS and outreach. The study used OSS (also known as FS), number of active borrowers (NAB) (breadth) and average loan balance per borrower (ALPB) (depth) to approximate MFIs sustainability scores in India. However, the sustainability index by Bhanot *et al.* (2015) focuses mainly on the alleviation of poverty by covering its cost of revenues, but it does not counter the impact of grants, subsidies, and donations on MFIs sustainability by ignoring FSS.

On the other hand, the dependence of MFIs on increased outreach without being financially sustainable may also be alarming (Mia *et al.*, 2015; Woller *et al.*, 1999). Financially unsustainable MFIs may benefit the poor for a short time, but in the long run, they are unable to help the poor because MFIs are gone (Bhanot *et al.*, 2015). Therefore, Kar (2013) and Kinde (2012) argued that both FS and outreach are essential for sustainable MFIs without displacement of one for the other.

Contemporary studies urge us to measure the sustainability of MFIs by using both indicators of FS and outreach. Sustainability of MFIs in Pakistan is also determined by using financial and operational self-sufficiency (Pakistan Microfinance Network, 2015b), ignoring the outreach. The current debate on microfinance has emerged to attain the dual goal of achieving FS and outreach, termed as 'double bottom line' (Guntz, 2011; Mia *et al.*, 2015). However, existing literature on MFIs sustainability is unable to provide a robust measurement of sustainability based on the double bottom line. This study is novel in conceptualizing a multidimensional construct to measure sustainability by focusing on both financial and outreach aspects.

In Pakistan, the microfinance industry currently stands at 3.63 million active borrowers with a gross loan portfolio (GLP) of PKR 90.10 billion (Pakistan Microfinance Network, 2015b). Despite these positive developments, the annual report of PMN highlighted that the potential market size for microfinance is 27 million clients (Pakistan Microfinance Network, 2015a) and the current penetration rate stands at approximately 7.4 percent. This large gap shows that the sector, despite all its achievements to date, is far from realizing its potential in Pakistan (Pakistan Microfinance Network, 2015a).

The question remains that with such an enabling environment, why is the sector unable to grow and achieve the scale necessary to have a comprehensive impact? (Pakistan Microfinance Network, 2015a). To answer the above question, PMN has conducted several studies to investigate the factors that affect the sustainability of MFIs in Pakistan (Aban & Zahra, 2011; Ammar & Ali, 2014). However, these studies mainly focused on factors such as natural disasters, macro-economic trends, credit risk, competition, and security. Instead, Consultative group to assist poor highlight that the factors such as profitability, portfolio quality, efficiency, productivity, and liability management are the key determinants of sustainability (CGAP, 2004). Nevertheless, MFIs in Pakistan were unable to attract the attention of researchers as there is a lack of empirical research on assessing the determinants of sustainability.

Furthermore, several researchers have also attempted to investigate the factors influencing MFIs sustainability in different countries (Adongo & Stork, 2005; Janda & Turbat, 2013; Rahman & Mazlan, 2014b; Rai & Rai, 2012; Tehulu, 2013). Though there has been a widespread trend among MFIs to replicate practices associated with these factors across

different countries, Woller and Schreiner (2002) observe that all factors may not have the same relevance across countries. Therefore, identification of factors relevant to the sustainability of MFIs in specific countries is needed (Marakkath, 2014). Hence, in this study, an attempt is made to identify the factors that may affect the sustainability of MFIs in Pakistan.

Moreover, previous literature was carried out by investigating the determinants of sustainability measured using FSS, OSS, depth, and breadth of outreach (Adongo & Stork, 2005; Janda & Turbat, 2013; Rahman & Mazlan, 2014b; Rai & Rai, 2012; Tehulu, 2013). However, this study develops a composite measure of the sustainability of MFIs using the double bottom line that necessitates the need to empirically investigate the factors that influence the sustainability of MFIs in Pakistan.

Furthermore, previous research related to factors influencing the sustainability of MFIs has found inconsistent results. For instance, portfolio at risk greater than 30 days (PAR>30) has a significant relationship with the sustainability of MFIs (Abdulai & Tewari, 2017; Tehulu, 2013). However, Kar (2012) found that PAR>30 days have an insignificant relationship with sustainability. Additionally, GLP has a significant positive relationship with the sustainability of MFIs (Abdulai & Tewari, 2017). However, Okumu (2007) found a negative impact of GLP on sustainability. Additionally, the debt to equity ratio (DER) has an insignificant relationship with the sustainability of MFIs (Abdulai & Tewari, 2017; Kar, 2012; Rahman & Mazlan, 2014b). On the other hand, DER has a statistically significant relationship with social efficiency (Wijesiri *et al.*, 2017) and FS of MFIs (Rahman & Mazlan, 2014a). Return on asset has a positive significant relationship with

financial efficiency but the insignificant relationship with social efficiency (Wijesiri *et al.*, 2017).

As mentioned above, previous studies have found inconsistent results. One possible reason for inconsistency might be attributed to the issues prevalent in the measurement of sustainability. For instance, none of the measures has captured MFIs sustainability using a multidimensional construct. The second possible reason might be that the scant of the studies have addressed the proxies of the life cycle of MFIs while determining the factors affecting sustainability. The rationale for considering Life cycle theory (LCT) can be justified based on the previous research. For instance, DeSousa-Shields and Frankiewicz (2004), Hollis and Sweetman (2001) and Bogan (2012) stated that the life cycle affects the factors that determine the sustainability of MFIs. The life cycle of MFIs has been approximated by taking age and size (see for example section 2.13.1).

According to Bogan (2008), Cull and Morduch (2007) and Oteng-Abayie *et al.* (2013), the age of MFIs positively impact sustainability. In another study, Robinson (2001) found that MFIs sustainability ratio varies with life cycle stages. MFIs below three years were 69 percent, below six years were 86 percent and above six years were 102 percent financially sustainable. Mature MFIs are more structured with procedures that help in attracting more investments and also increase their return on equity (Campbell & Rogers, 2012; Kipesha & Zhang, 2013). According to Bogan (2008), Cull and Morduch (2007) and Oteng-Abayie *et al.* (2013) maturity of MFIs also influences profitability. The increase in age of MFIs also increases the portfolio quality thus decreasing PAR>30 days (Vassilakis, 2008).

According to Jovanovic (1982), Majumdar (1997) and Coad *et al.* (2010) productivity level of the firms also increases with its age. Mature MFIs are good at controlling their cost which helps them lead to efficiency (Bogan, 2008). Bogan (2008), Cull and Morduch (2007) and Oteng-Abayie *et al.* (2013) have found that an increase in age of MFIs leads to efficiency. Liability management of MFIs also has a significant relationship with age (Kipesha, 2013; Kyereboah-Coleman, 2007). GLP has a direct correlation with age of MFIs (Coad *et al.*, 2010; Nwachukwu, 2014). Thus, the age of MFIs has a significant relationship with profitability, portfolio quality, productivity, and liability management. Contemporary study urges us to understand the moderating effect of age on a relationship between profitability, portfolio quality, productivity, efficiency and liability management and sustainability of MFIs in Pakistan.

Nyamsogoro (2010), Bogan (2008), Mersland and Strøm (2008) and Cull and Morduch (2007) found that size of MFIs has a significant positive correlation with sustainability due to the cost-benefit linked with it. MFIs which have more assets usually tends to be more profitable (including both ROA and ROE) (Hartarska, 2005; Robinson, 2001; Wale, 2009). On the other hand, the size of MFIs also has a significant relationship with portfolio quality (Kyereboah-Coleman, 2007; Majumdar, 1997). Due to their size of operations, large firms significantly impact staff productivity, liability management and gross loan portfolio (Tripsas & Gavetti, 2000; Wald, 1999; Yang & Chen, 2009). Contemporary studies urge us to understand the moderating effect of size on a relationship between profitability, portfolio quality, productivity, efficiency and liability management, and sustainability of MFIs in Pakistan.

The above discussion highlights that it is critical to address the issue of sustainability measurement for MFIs in Pakistan. There is a need to identify the determinants of sustainability of MFIs in Pakistan due to lack of empirical research and the need for country-specific determinants. Review of existing empirical studies highlights that the determinants of MFIs sustainability have inconsistent results. Henceforth, there is a need to identify the moderating effect of age and size on the relationship of factors affecting the sustainability of MFIs in Pakistan.

1.3 Research Questions

The study helps to answer the following questions:

1) What are the aggregated sustainability scores for MFIs in Pakistan based on double bottom-line (using financial self-sufficiency, operational self-sufficiency, breadth and depth of outreach)?
2) Is there any impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs in Pakistan?
3) Does age moderate the impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs in Pakistan?
4) Does size moderate the impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs in Pakistan?

1.4 Research Objectives

The objectives of the current study are;

1) To develop a composite sustainability index of MFIs using double bottom line (using financial self-sufficiency, operational self-sufficiency, breadth and depth of outreach).
2) To identify the impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs in Pakistan.
3) To examine the moderating effect of age on the impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs in Pakistan.
4) To examine the moderating effect of size on the impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs in Pakistan.

1.5 Significance of Research

In this study, an aggregated sustainability index for MFI is developed, using a double bottom line. Previous researchers have attempted to develop the sustainability index (Bhanot *et al.*, 2015; Christen, 1995; Okumu, 2007; Rai & Rai, 2012), but they fail to consider the dual mission of MFIs. This study is holistic for the microfinance sector of Pakistan due to lack of composite measure based on the double bottom line to analyze MFIs sustainability. By using this measurement, managers may be able to identify the

sustainability level of their MFIs. The proposed index may be used in different countries and help policymakers to have a clear understanding of the strength and weakness of the industry.

It may help organizational management, government and developing agencies in understanding the factors which influence the sustainability of MFIs. This model may be considered as one more step in the process of the emergence of the microfinance standards. MFIs performance and improvement areas are identified that may be helpful to minimize the risk of delinquency for management. This study aims to determine the performance of MFIs and provide better understanding in identifying risk and benefits to the investors. Also, the identification of strength and weakness of MFIs may help minimize the transaction uncertainty. Furthermore, it is expected that factors identification would also help MFIs to attract investors and access capital markets (Rai & Rai, 2012).

Furthermore, this study provides an insight into the impact of proxies of Life cycle theory on MFIs sustainability. The application of LCT has previously been used in MFIs literature for an understanding of the capital structure and firm performance (Bogan, 2012; DeSousa-Shields & Frankiewicz, 2004). This study is unique to apply LCT in understanding how changing life cycle of firm influence the performance of MFI.

1.6 Scope of Research

The scope of this study lies in developing a sustainability index for Pakistan MFIs. The rationale of this study lies in helping the readers reflect beyond financial indicators to judge

the sustainability of MFIs. This study conceptualizes sustainability from outreach and self-sufficiency perspective based on the double bottom line. Furthermore, this study uses unbalance panel data of microfinance institutions in Pakistan. The total number of MFIs in our sample is 38 whose data has been taken from the period 2006-2015. Principal component analysis is used in this study to develop a sustainability index for MFIs in Pakistan. Moreover, this study further empirically tests the factors which influence MFIs' sustainability in Pakistan. Fixed effect GLS regression is used to determine the factors that influence the sustainability of MFIs. Additionally, the moderating effect of the proxies for the life cycle is also tested using the moderated regression model.

1.7 Organization of the Thesis

The current study is organized into Five Chapters. In the first chapter, the problem of sustainability for MFIs in Pakistan have been identified. Furthermore, the issue in the measurement of sustainability of MFIs is also discussed in this chapter. This study identified that there is no generalized tool or index to measure the level of sustainability for MFIs in Pakistan. The proposed index in this study is the sole measure to provide a comprehensive sustainability index for MFIs. Furthermore, the impact of profitability (ROA and ROE), portfolio quality (PAR>30 days), productivity (BPSM), efficiency (OER), liability management (DER) and GLP on sustainability are identified. The possible interaction of life cycle stages on the impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs have been discussed Thus a purpose statement is developed by problems identified.

Furthermore, research questions, research objectives, significance and scope of the study are discussed.

The second chapter provides an introduction about microfinance institutions, history of microfinance institutions, and development in microfinance sectors. Furthermore, the issues related to the sustainability of MFIs are also discussed. A critical review of existing literature highlights some key determinants of sustainability that are also discussed in this chapter. Underpinning theory and prior empirical literature are discussed in detail in chapter two.

Chapter three covers the research methodologies used in this study. The sustainability index for MFIs based on the double bottom line is developed in this study. Along with, research framework, hypothesis development, variable definitions, and measurement are also provided in this chapter. At the end of the chapter, the data collection process and analysis methods that are used to achieve the research objectives are also discussed in detail.

Chapter four provides the sustainability scores of MFIs and descriptive statistics of both independent and moderating variable used in this study. The estimation results for fixed effect regression and moderated regression model are presented. This chapter also provides a summary of the hypothesis and discussion on the results of the regression analysis for MFIs in Pakistan.

Chapter five provides recapitulation and implication of findings for the current study. The chapter also provides contribution and limitations of the study. Furthermore, the chapter is concluded by providing recommendations for future research. The organization of the thesis is presented in Figure 1.1

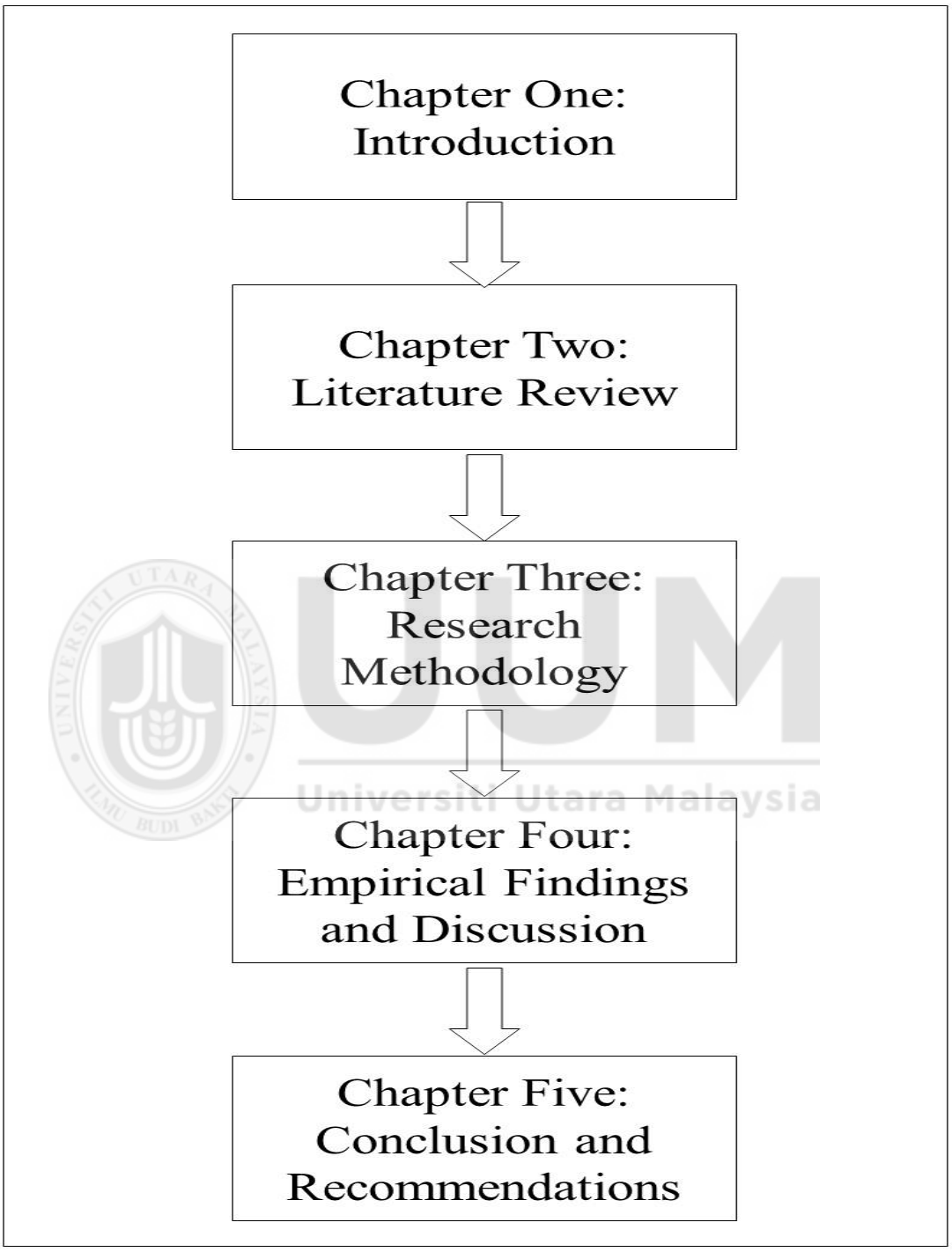

Figure 1.1:
Organization of Thesis

CHAPTER TWO

LITERATURE REVIEW

"To grow as general public and as a nation, to improve the World and standards of life for everybody, there is a need to sow the seeds of progress at the base rather at the top" (Peet & Hartwick, 2015, p. 1)

2.1 Introduction

Since the inception of civilization, poverty has been an issue for humanity, and battle for the survival of human exists. Among several other factors leading to poverty, limited availability of financial facilities to the poor people is also one of the major reasons for poverty (Tehulu, 2013). Poor people of the society lack access to any financial facility as they were unable to offer collaterals and securities against credits. Formal financial institutions provide facilities only for new companies and business, to begin and expand their operations, who offer collaterals and securities against credit.

Poor people of society also need various monetary services, including loan facilities, savings, insurance, and funds transfer (CGAP, 2004). Microfinance was introduced to facilitate the poor by providing them credit and other facilities. Microfinance is a loan/credit facility provided to the people having lesser income and small organizations which were neglected by the existing formal financial institutions. Microfinance institutions became the solution to the poverty problem by providing credit facilities to poor people for starting a small business (Tehulu, 2013). These financial institutions were not restricted to provide loans/credit facilities only, but include other services such as

insurance, education, health, social awareness, and savings/deposits. Thus microfinance, by empowering poor, is a concept of poverty reduction (Manos & Yaron, 2009).

2.2 Microfinance Institutions

Microfinance, besides financial solution, is the major contributor for the alleviation of poverty and long-term economic growth (CGAP, 2004; Manos & Yaron, 2009), as long-term development can be achieved by financial inclusion of the poor (Rahman & Luo, 2011). Various institutions can be microfinance provider, including credit unions, financial intermediaries, banks and non-profit organizations. They are known as microfinance institutions (MFIs) (Muwamba, 2012; Olasupo *et al.*, 2014). These organizations differ from each other by organization focus and clientele but do not restrict to these only. A brief history of MFIs is discussed in the next section.

2.2.1 History of Microfinance Institutions

Microfinance laid its footsteps several hundred years ago. In the beginning, different forms of loans/credit facilities for small farmers and poor people were provided by individuals, donors, charity associations and informal lenders in unstructured form and these fund providers were commonly known as informal microfinance institutions. In the early 1970s, these financial intermediaries were replaced by microfinance banks and agencies which are now known as formal microfinance institutions. Few examples of formal and informal MFIs in different countries are discussed below.

Since the 15th century, informal MFIs in Nigeria have been helping poor people of society. In the 16th century, informal finance laid its roots in different parts of Europe. In Ireland, the first loan fund for poor was started during 1720 followed by a slow growth until the transformation of charities and donation funds as financial intermediaries. In 1823, these financial intermediaries started accepting deposits and charged interest rates for the first times on the credits provided by them (Seibel, 2003). Similarly, in Germany, during 1847, Raiffeisen and Schulze-Delitzsch established rural and urban savings and credit cooperatives to help poor (Seibel, 2005). All these urban and rural credit associations were regularized under the German Cooperative Act 1889. According to Morduch (1999), the total number of poor people served by these cooperatives in 1910 was increased to 1.4 million.

In Asia, a different type of informal credit systems was found, some were as old as 2200 years, including Paluwagan (Philippines), Artisan (Indonesia), Chit funds (India) and Hui (China). In Asian sub-continent[3], different types of informal financial intermediaries exist from 13th to the 18th century that was later replaced by Raiffeisen model in 1892. Later in 1912, to support the rural self-help groups, some changes were made in the Co-operative Societies Act. In 1919, different provinces in the Asian sub-continent were given authority to implement their cooperative laws which were later withdrawn in 1954 on the endorsements of Cooperative law committee and All India Rural Credit committees

[3] Asian Sub-continent includes India, Pakistan and Bangladesh before the countries obtained their independence

(Seibel, 2005). In the 1950s, governing bodies, as well as international donors in different Asian countries, started subsidized loan to farmers (Rogaly, 1996).

After independence, the government of Pakistan initiated informal funding through Village Aid package program to help poor people. This five-year program was initiated in 1953 and was later extended until 1962. However, the program was later abandoned as the government of Pakistan established the Agriculture Development Bank to provide subsidized funds and small loans to farmers and poor people in rural areas (Farooq & Khan, 2014). From the 1980s to 1990s, several rural support programs including; Orangi Pilot Project (1987), Agha Khan RSP (currently First microfinance bank), Sarhad RSP (1989) and National RSP (1991) were started to overcome poverty level through subsidized funds (Ahmad, 2011).

Formal microfinance institutions were established during the 1970s. Bank Dagan Bali Indonesia is currently one of the biggest MFIs in the world and established in 1970. Later in 1973, the first microloan for poor was disbursed by ACCION in Brazil which was followed by Muhammad Yunus first loan in Bangladesh. In 1972, Muhammad Yunus from Bangladesh lent a small amount of $27 to 42 people in his country which later formalized as Grameen Bank. The revolution in the microfinance industry was observed after the year 1974 when Muhammad Younus established Grameen Bank in Bangladesh. In Pakistan, Khushali Bank was established in 2000, under a development program for the microfinance sector, for helping the poor by providing subsidized loans and credits (Rauf & Mahmood, 2009).

On another side, Islamic Microfinance has been progressively growing in the world, particularly in developing countries, as a credible alternative which allows poor populations access to basic financial services at low cost (Abdelkader & Salem, 2013). Islamic Microfinance is considered as an efficient instrument to encourage entrepreneurship and facilitate the creation of Small to Medium Enterprises (Ahmed, 2002). However, the supply of Islamic microfinance products is concentrated in a few countries; the top three are Indonesia, Bangladesh, and Afghanistan where the demand is high, accounting for 80 percent of global outreach. Nevertheless, demand for Islamic microfinance products is strong (Abdelkader & Salem, 2013). While conventional microfinance institutions have expanded their operations in the last two decades, poverty-focused microfinance based on Islamic principles is also growing rapidly. According to a global survey conducted by the Consultative Group to Assist the Poor (CGAP) in 2007, Islamic microfinance has a total estimated global outreach of only 380,000 customers served by 126 institutions in 14 countries and accounts for only an estimated one-half of one percent of total microfinance outreach. These findings corroborate with recent data in 2011 showing that Islamic MFIs have stagnated below 10.000 thousand active borrowers whereas conventional MFIs are reaching hundreds of thousands of active borrowers. According to the 2013 CGAP focus note on Islamic Microfinance, the overall supply of Islamic products is still quite small relative to the conventional microfinance sector in spite of a twofold increase in the number of providers and the number of poor clients using Sharia-compliant products. Based on CGAP surveys in 2011, customers using Sharia-compliant products represent less than 1 percent of total microfinance outreach (Khaled, 2011). In Pakistan, Akhuwat is the only microfinance institution working on the principles

of Islamic finance. However, the majority of MFIs in Pakistan are based on conventional principles of finance. Thus, this study mainly focuses on conventional microfinance institutions operating in Pakistan.

2.2.2 Microfinance Institutions Today

During the early days of 2011, microfinance achieved a milestone of reaching more than 200 million poor across the globe (Maes & Reed, 2012). According to the data reported to the MIX market in 2014, the total gross loan portfolio of MFIs has reached USD 78 billion. Therefore, microfinance is considered as the best available tool for sustainable development and growth. The same was also endorsed as Muhammad Younus received Nobel Prize in 2007 for his contribution in reducing poverty through microfinance.

There are two major goals for microfinance institutions (Chenuos *et al.*, 2014). The first goal of MFIs is to contribute towards the development by approaching a maximum number of clients and reaching the poorest (Nanayakkara, 2012). The second important goal for MFIs is to reach poor clients by achieving financial sustainability (FS). According to Olasupo *et al.* (2014), MFIs management should be efficient in promoting both objectives. Woller *et al.* (1999) also introduced two approaches known as "the Institutionist approach" and "the Welfarist Approach." Institutionist approach sticks with FS of institutions followed by poverty alleviation, whereas, Welfarists approach emphasized on reaching poor clients by using subsidized funds.

Since microfinance promises to develop its customers and provide capital to overcome poverty. Therefore, understanding of MFIs sustainability is essential for the well-being of individuals and business (Muwamba, 2012). The sustainability achievement, in this case, means attaining the FS along with the attainment of reduction in poverty level (Nanayakkara, 2012).

2.3 Sustainable Microfinance Institutions

Chaves and Gonzalez-Vega (1996) view sustainability as the organization's ability to use its financial resources or borrowings on market rates for providing financial services on a regular basis. Okumu (2007) cited the definition of sustainability as the institution's ability to generate enough reserves for capitalization by covering its operational cost. The term sustainability is commonly used in many fields such as environmental science, development economics, and agricultural sector development particularly in the developing world where agriculture is the major economic sector or covers the significant share of the gross domestic product of the countries. Sustainability is commonly known as the organization's ability to cover both its operational and financing cost from its revenues and also expanding its services (Rahman & Luo, 2012).

Sustainability of microfinance institution is simply defined as their capacity to continue as a going concern by providing services to targeted people ignored by the conventional financial institutions (Rao, 2014). For instance, MFIs should not be dependent on grants and subsidies, mostly concessional loans to operate. The argument support that MFIs should provide the financial services particularly credit by being free from any subsidy.

When credit providers receive gifts and grants, profitability is achievable, but long term sustainability becomes questionable (Bogan, 2012). Also, Bogan *et al.* (2007) found that subsidy and MFIs sustainability are inversely related. Therefore, if there is subsidy injection to the financial system of the institutions, their ability to be sustainable become questionable as subsidies may cease at some point in time.

In microfinance, sustainability refers to the ability of the institution to operate efficiently without dependence on subsidies and reaching the deprived people who are ignored by the conventional financial institutions. Thus, the sustainability of MFIs refers to the achievement of dual goals; 1) achieving financial sustainability and 2) reaching the maximum number of poor people (known as outreach) and is commonly known as "Double bottom line" (Dunford, 2000; Guntz, 2011).

2.3.1 Financial Sustainability

Financial sustainability (FS) determines the MFIs ability to recover the cost of its operations from revenues generated (Rahman & Luo, 2012). FS is possible if microfinance institutions generate enough profits to continue its operations without subsidies, covering all its expenses (Ayayi & Sene, 2010; Rao, 2014), as FS is negatively related to debt and grants (Sekabira, 2013). Thus, MFIs are financially sustainable if they can cover financing cost (with inflation adjustment), operating cost and cost for its growth without subsidies (Christen, 1995).

According to CGAP (2004), if MFIs want to reach a maximum number of target poor they must achieve FS. Due to non-availability of financial intermediaries, financial services were not available for poor people. FS is not the only solution to this problem. Rather, it is an indicator of the redemption of the institution from donor funds to reach a significant level of self-dependency (CGAP, 2004). Thus, FS of MFIs means reaching the maximum number of unbanked/poor people while reducing the cost of the transaction and fulfilling client needs by offering better products and financial services.

FS is measured using operational self-sufficiency (OSS) and financial self-sufficiency (FSS) (see, for example, Bogan *et al.*, 2007; Chaves & Gonzalez-Vega, 1996; Cull & Morduch, 2007; Islam *et al.*, 2014; Lenssen *et al.*, 2014; Rahman & Mazlan, 2014c; Rai & Rai, 2012). FSS and OSS are discussed in detail in the next sections.

2.3.1.1 Financial Self-sufficiency

Financial self-sufficiency (FSS) is the ability of the organization to complete its operations without depending on subsidies (Morduch, 1999). FSS has become a popular measure of MFIs performance and is adopted by the Micro banking bulletin (MBB) as a principal measure of financial sustainability (Manos & Yaron, 2009). Based on FSS data published in the MBB of spring 2008, it appears that out of 340 MFIs reviewed in 2006, 244 (72%) were FSS. Furthermore, according to the FSS ratios presented in the various MBBs, the share of MFIs becoming financially self- sufficient has risen significantly in recent years.

According to Gibbons and Meehan (1999), attaining FSS is important for MFIs to benefit poor households. FSS is also essential for approaching the maximum number of poor people living at the bottom line. As MFIs begin to be independent of donor funds and adopt banking principles, they tend to reduce their cost and innovate better products and services (Conning, 1998). The reduction in cost lead to profitability and MFIs would be able to invest in capital funding. Furthermore, it helps in a massive increase in outreach to the poor and MFIs would significantly contribute to the alleviation of world poverty.

According to CGAP (2003), FSS measures MFIs ability to cover its costs while considering few adjustments to operating expenses, inflation, subsidies, and revenues. These adjustments represent that MFIs is capable of covering its cost and expanding its operations without being subsidized. Thus, FSS refers as MFIs ability to cover its operating expenses while making subsidy and inflation adjustments with its adjusted income produced from its financial operations and services.

According to Gibbons and Meehan (1999), dual adjustments are made for Inflation;

1) the adverse effect of inflation cost on the value of equity, and
2) its positive effect on liabilities and non-financial asset.

Correspondingly, subsidy adjustments are also of two types;

1) adjustments for grants or direct donations received to cover MFIs operating expenses, and

2) adjustments for subsidies in term of loans at interest rates which are less than market rates and other donations for technical support, staff salaries, rent payments, communication expenses and use of donated infrastructures.

These adjustments are helpful for MFIs in understanding the commercial feasibility of its operations and services by making a comparison of adjusted values of operating income to operating expenses. A value greater than 1 shows MFI is financially self-sufficient. Contrary to the above, a value less than one shows MFI is not financially self-sufficient.

2.3.1.2 Operational Self-sufficiency

Operational self-sufficiency (OSS) refers to MFIs ability to cover expenses from operating profits (Rahman & Mazlan, 2014b). This expenditure covers all cost of operations such as financial expense incurred, expenses from operation and loan loss provision expense. OSS has become a popular measure of MFIs performance and has been used in several studies as a principal measure of financial sustainability (Bogan, 2008, 2012; Bogan *et al.*, 2007).

If this ratio is greater than 100 percent, MFIs are covering all of their costs through their operations (Churchill & Frankiewicz, 2006). OSS, in general, includes all the cash costs of running MFIs, depreciation and the loan loss reserve. Sometimes donors exclude the cash costs of funds from their analysis because "those MFIs that begin to access the commercial financial markets and pay the cost of capital would look relatively worse than other institutions with the same costs and outreach, but who have remained reliant on donor capital to fund their portfolio" (Guntz, 2011). This applies because some donor fund

dependent institutions do not have the same financing cost as commercial MFIs (Guntz, 2011).

2.3.2 Outreach

Outreach is measured by the depth and breadth of essential services of microfinance institutions (MFIs) such as credit provision, savings mobilization, micro insurance, money transfer, and payment services (Rao, 2014). It measures how well MFIs reach their target clients and fulfill the financial services demand of the clients (Yaron, 1994). Yaron (1994) and Okumu (2007) describe outreach as MFIs efforts to provide service to poor people of the society formally unserved by other financial institutions. They further describe that outreach is categorized as breadth and depth, where the breadth of outreach represents the number of poor clients reached. The depth of outreach represents the socioeconomic impact which MFIs services have on the target customers.

Schreiner (2001) proposes a six-dimension approach for measuring the outreach. These dimensions are;

1) the outreach depth, measured as average loan size,
2) worth to users approximated using dropout rate,
3) the cost to users, measured using interest rate charged,
4) length of outreach, approximated by financial performance or FSS,
5) width measured using number and percentage change of clients served, and
6) the scope of outreach in terms of insurance, savings, and types of loans.

On the other hand, Yaron (1994) suggested seven measures of outreach including;

1) loan portfolio outstanding and the average amount of loan provided,
2) total customer savings and their average amounts,
3) financial services provided,
4) the quantity of village unit and branches,
5) percentage of village population reached,
6) real yearly growth in MFIs assets and
7) Women borrowers.

The comparison between Schreiner and Yaron implies that outreach is measured as depth, breadth, and scope of outreach. However, there is strong empirical evidence which has emphasized that outreach is measured using depth and breadth (Kar, 2013; Quayes, 2015; Vanroose & D'Espallier, 2013).

Table 2.1
Comparison between Schreiner and Yaron

Outreach	Depth of Outreach	Breadth of outreach	Scope of outreach
Schreiner (2001)	1) average loan size 2) dropout rate 3) the interest rate charged 4) financial performance	5) number and percentage of clients served	6) Insurance, savings, and types of loans
Yaron (1994)	1) loan portfolio outstanding and the average amount of loan provided; 4) the quantity of village unit and branches 5) percentage of village population reached 6) real yearly growth in MFIs assets;	2) total customer savings and their average amounts 7) women borrowers	3) financial services provided

The depth of outreach may also be defined as the "poverty level of clients served by MFI" (Rao, 2014; Rauf & Mahmood, 2009). It narrates the line of poverty or the extent poor does not have access to regulated financial institutions. The proxy for depth of outreach is the average loan size per borrower (Bhanot *et al.*, 2015; Nanayakkara, 2012; Okumu, 2007). The breadth of outreach refers to "the scale of operations of an MFI" (Rao, 2014). The proxy for the breadth of outreach is the "number of active borrowers" (Kinde, 2012; Rai & Rai, 2012; Rauf & Mahmood, 2009).

According to Mersland and Strøm (2010), for MFIs, the risk associated with variation in the average size of the loan is unpredictable. Results describe that when loan size is small, MFIs are more cost-effective. As average loan size increases, it increases the average operational cost thus increasing the average profit of an MFI. However, Kumar Kar (2011) found that MFIs should be careful in increasing the size of the loan as the risk associated with the loan also increases. Thus, the optimal size of the loan should be decided carefully. The increase in loan size also enhances the possibility of a loan default that affects MFIs profitability. MFIs with smaller ALPB usually reach a large number of poor clients which shows a better depth of outreach. Similarly, MFIs whose ALPB is large tend to reach less poor clients thus resulting in a mission drift (Kar, 2013).

2.4 Sustainability and the Double bottom line

The fundamental question is on whether microfinance could reach the largest number of very poor people while at the same time maintain its financial sustainability (FS) (Rahman *et al.*, 2015). The point of debate in the current literature revolves around the achievement

of the double bottom line. The "Institutionist" and "Welfarist" approaches in microfinance literature provide two different arguments.

According to the Welfarists approach, the core purpose of MFIs is to reach a maximum number of poor people (Woller *et al.*, 1999). Outreach may be achieved by using subsidies and financial support from the government. They argued that if credit facilities are provided to the poor people without government support, there are the possibilities that MFIs may charge a higher interest rate. The supporter of the Welfarist approach contends that poor people are unable to afford high interest rates. Therefore, if MFIs focus on achieving financial sustainability, they charge a higher interest rate and focus on wealthier clients and deviate from their goal of reaching a large number of poor borrowers.

Contrary to the Welfarists, the supporter of Institutionist approach contends that MFIs should mainly focus on achieving financial sustainability (Woller *et al.*, 1999). They argue that financially sustainable MFIs are better able to reach the maximum number of poor people (Epstein & Yuthas, 2010). According to this view, financially sustainable MFIs are better able to reduce their operational cost and yield revenue by using their loan portfolio. Moreover, empirical studies further show that the interest rate does not affect the outreach to the poor. They claim for the non-existence of the negative relationship between FS and client's poverty level (Hermes & Lensink, 2011). This argument is supported by the view that outreach to a large number of poor people regularly, in the long run, is not possible if MFIs are financially unsustainable (Hermes *et al.*, 2011).

From the above discussion, it is evident that the increase in a shift of MFIs towards financial sustainability may deviate them from their goal of reaching maximum poor people. The shift is commonly known as mission drift, where MFIs focus on the increase in wealthier clients instead of poor borrowers. According to (Woller *et al.*, 1999), when MFIs ignore the poor customer segment, mission drift occurs. Additionally, Schreiner (2002) argued that mission drift weakens the outreach to the poor. Furthermore, Armendáriz and Szafarz (2011) argued that increase in average loan size relates to mission drift, as it is motivated by the profit-seeking behavior of MFI, reduce average operational cost and increase the profitability.

However, a review of the literature does not support the existence of mission drift. For example, Rhyne (1998) supported that commercialized MFIs provide better services to poor customers because the profit-oriented MFIs tend to be more efficient and seek new markets to extend their loan products. Additionally, Fernando (2004) evaluates 39 MFIs and does not find the sign of mission drift. The study concludes that the financial position of these MFIs improved without deviating from their mission. Another case study of MFIs in Bangladesh by Hishigsuren (2007) also did not find any statistically significant signs of mission drift. They also suggest that an increase in cost efficiency of MFIs is positively related to scope, quality, and depth of outreach. Littlefield *et al.* (2003) find that the efficiency of MFIs in terms of cost per borrower is better for the programs that focus poor customers and support the non-existence of mission drift. Additionally, Tchakoute-Tchuigoua (2010) points out that banks and non-bank financial institutions (NBFIs) exhibit a better breadth of outreach and finds no indications for mission drift.

Furthermore, Bos and Millone (2015) found that MFIs with a high depth of outreach are most efficient, resulting in higher levels of outreach and profits for the same input mix. Nurmakhanova *et al.* (2015) propose a comprehensive model which includes both 'outreach' and 'financial sustainability' as endogenous variables and allows for a possible link between them. The result shows that focusing on financial sustainability does not necessarily hurt the depth and breadth of outreach.

Review of literature shows that the issue of trade-off does not provide any strong empirical support. Thus, holistic sustainability may be achieved by being financially sustainable and attaining maximum outreach. Henceforth, MFIs need to attain a double bottom line, achieving FS and outreach together.

Moreover, the literature shows that the sustainability of MFIs is based on four measurement variables including FSS, OSS, depth of outreach and breadth of outreach. Researchers are facing problems in determining the consistent measurement for sustainability (Wijesiri *et al.*, 2017). In the next section, the issues in measuring the sustainability of MFIs are discussed.

2.5 Issues in Sustainability Measurement

The consistency and accuracy of the existing measures for sustainability are questionable as they ignored the achievement of the double bottom line (Saad *et al.*, 2018). Based on the discussion above, the existing measurements of sustainability found in the literature are reviewed under double bottom line principal and shortcomings are discussed.

Financial sustainability (FS), one of the two goals, is defined as MFIs ability to generate revenues that cover the financial and operating cost, adjust bad loans and further expand financial services (Rahman *et al.*, 2015). It is further explained in terms of financial self-sufficiency (FSS) and operational self-sufficiency (OSS) (Lenssen *et al.*, 2014; Rahman & Mazlan, 2014a). OSS measures MFIs ability to cover operating and financial expenses from its revenues. These include all operational expenses such as expense from operations, expenditure from the provision for loan losses and expenses incurred on financial activities (CGAP, 2003). FSS refers to the independence of the institution from subsidy and operating successfully. FSS considers three types of adjustments for subsidies including adjustment for subsidized interest rates, inflation, and write-offs and loan loss provision.

Eventually, this gives rise to a debate about whether subsidizing interest rates is justified (Hermes & Lensink, 2007). As discussed previously, Welfarist advocates that the poor cannot afford higher interest rates; hence increased emphasis on financial sustainability goes against poverty outreach. On the other hand, Institutionist claims the non-existence of any such empirical evidence where poor cannot afford higher interest rate, nor that the poverty level of clients and financial sustainability are negatively correlated. Despite the shift of microfinance paradigm towards financial system approach, the debate continues to exist. Thus, in this study sustainability is conceptualized based on the double bottom line of achieving financial sustainability and outreach simultaneously. Yaron (1994) also argued that successful rural financial institutions need to focus on being subsidy independent and reaching maximum outreach.

Wijesiri *et al.* (2017) argued that existing literature used several methods to measure and evaluate the performance of MFIs but still there is a lack of robust measurement for MFIs sustainability. They further highlighted that commonly used methods include traditional financial ratios. FSS and OSS are commonly used measure for the financial sustainability of MFIs. OSS measure MFIs ability to cover their expenses using income generated from the operations (Okumu, 2007). Measuring sustainability using OSS is criticized as being operational self-sufficient does not provide any detail about income generated from subsidies and deviation of MFIs from reaching the poorest. Furthermore, FSS measure MFIs ability to cover its expense from income by remaining independent of subsidies (Christen, 1995). However, Manos and Yaron (2009) and Bhanot *et al.* (2015) disagree of measuring sustainability using financial measures only, as these measures do not provide information about the performance of MFIs in alleviating poverty.

Yaron (1992) proposed a subsidy dependence index (SDI), to measure the sustainability of rural microfinance institutions. The index measures the dependence level of MFIs on grants, and the degree of interest rural financial institutions should adopt to be independent of subsidies[4]. Several studies found in the literature have used SDI to determine the sustainability of MFIs (Manos & Yaron, 2009; Wijesiri *et al.*, 2017). Although the calculations using SDI are useful, the index has major drawbacks as highlighted by the previous researches. Hermes and Lensink (2007) argued that an increase in lending rates does not necessarily increase the profit (as assumed by SDI) because moral hazard effects and adverse selection could lead to lower profits. Cull et al. (2007) in their study on leading

[4] For detail understanding of Subsidy dependence index see (Yaron, 1992)

microbanks had to deal with this issue. Additionally, SDI did not provide any information on the minimum acceptable level of subsidies. Moreover, Chaves and González Vega (1993) argued that the calculation of SDI is not possible due to the non-availability of the required data. Additionally, Morduch (1999) and Nanayakkara (2012) argued that dependence on SDI only focuses on the financial sustainability of MFI. An increased effort of MFIs to become subsidy independent using SDI may result in higher lending rates and lower outreach.

A recent measure following the double bottom line is developed by Bhanot *et al.* (2015) for MFIs in India. They include both financial (OSS) and outreach (breadth and depth) measure to develop the MFIs sustainability index. "Technique for order preference and similarity to ideal solution" is used in their study to determine the sustainability score of MFIs. Although, the index follows the dual goal of microfinance, it does not include the eradication of the role of subsidy to achieve sustainability as they ignore FSS measure in their sustainability index. Saad *et al.* (2018) criticize the measurement developed by Bhanot *et al.* (2015), signifying that MFIs are unable to achieve sustainability if they are dependent on subsidies. Adongo and Stork (2005), find that MFIs which are not dependent on external support are usually more productive in increased outreach. Additionally, long-term dependence on subsidy leads to incompetent MFIs which are unable to attract funds from the commercial investors due to inefficient operation and costly outreach (Bogan, 2008). Microfinance borrowers are high-risk as they do not offer collateral and bear more information and transaction cost due to the small loan (Pollinger *et al.*, 2007). Therefore, Nyamsogoro (2010) emphasizes on not having MFIs instead of holding unsustainable ones who are unable to cover their cost of operation.

Mutually, FSS and outreach are necessary for MFIs performance without displacement of one for the other (Kar, 2013; Kinde, 2012). In a study by Annim (2012), analysis of data shows that MFIs that have better depth of outreach were operationally self-sufficient. Zeller and Meyer (2002) introduced "the triangle of microfinance" which was consistent with the above studies. According to Zeller, successful microfinance institutions should be financially sustainable, have positive outreach to the poor and should be helpful in poverty alleviation. Morduch (2000) and Paxton (2002) discussed the winning proposition for the sustainability of MFIs if both costs of operation and maximum outreach to the poor people were achieved without external support by donors funds or government subsidies.

After reviewing the existing literature and evaluating the existing measures on the double bottom line principle, this study proposes a robust measurement for the sustainability of MFIs. Keeping in mind the dual goal of microfinance, this study conceptualizes sustainability in the context of both financial sustainability and outreach achieving a double bottom line.

Nevertheless, the measurement of sustainability level has been a serious problem that is not discussed. Without understanding the sustainability level of microfinance institutions, it would not be significant to investigate the drivers which influence MFIs sustainability. The next sections discussed various factors that are deemed important for MFIs sustainability by previous researchers.

2.6 Profitability and Sustainability

The profitability of MFIs is important in maintaining a sustainable microfinance industry (Muriu, 2011). Profitable MFIs have the capacity to absorb negative shocks, that subsequently affect sustainability. Profitability reflects how efficiently MFIs operate, manage their risk, capitalize their resources, manage their staff and accomplish their competitive strategies (Muriu, 2011).

Return on asset (ROA) and return on equity (ROE) are the key measures used for the profitability of MFIs (Sanfeliu *et al.*, 2013; Wijesiri *et al.*, 2017). They tend to summarize performance within the institutions. Usually, MFIs that have poor portfolio quality have negative profitability. According to Von Stauffenberg *et al.* (2003) profitability measures, ROA and ROE are the better indicators of performance in any institution.

2.6.1 Return on Asset

According to CGAP (2003) and Mersland and Strøm (2009), return on asset (ROA) is used to quantify the profitability of the financial organization. Similarly, Von Stauffenberg *et al.* (2003) and Rahman and Mazlan (2014b)emphasized that ROA reflects the marginal profit in MFIs and evaluates organization ability to generate profit by utilizing its assets.

In microfinance, positive ROA helps organizations to attract funds from commercial investors and become a regulated commercial institution (Adhikary & Papachristou, 2014). According to Hartarska (2005) and Zeller and Meyer (2002), MFIs normally take 5-6

operational years to have positive ROA, which is based on the service delivery system and technology they use.

Over the last few years, the profit-seeking behavior of MFIs and its impact on the outreach of the poor is under debate. Several types of research support that MFIs that are focused towards achieving profit use these surplus funds in helping more poor people especially when there is a limited supply of donor funds and subsidies (Robinson, 1998; Schmidt & Zeitinger, 1997). On the flip side, researchers argue that MFIs that focus on profitability charge higher interest rate and focus on providing loans to wealthier people instead of extremely poor people.

Tucker and Miles (2004) in their study compared the performance of 57 MFIs from March 1999-2001. Results concluded that ROA and ROE have a positive correlation with MFIs sustainability. Furthermore, Louis and Baesens (2013) also found that MFIs profitability is positively linked to sustainability. Another study was done by Zaigham and Asghar (2011) to compare the sustainability of MFIs in Pakistan. They found that MFIs in Pakistan were not sustainable due to negative ROA.

Kar (2013) found that ROA has a significant negative relationship with outreach. The objective of the study was to find the possible existence of mission drift. Additionally, Mia and Lee (2017) revealed that MFIs which are more focused towards the achievement of positive ROA results in a decrease in outreach to the poor. The objective of the study was to identify the determinants of mission drift, specifically focusing on the effect of funding sources. The study used data for the period 2009 to 2014 of 169 MFIs working in

Bangladesh. Panel data estimation revealed that ROA negatively influences the outreach of MFIs.

However, Wijesiri *et al.* (2017) found that ROA has an insignificant relationship with social efficiency of MFIs. Furthermore, Lebovics and Hudon (2014) and Gutiérrez-Nieto *et al.* (2009) have also found that ROA has an insignificant relationship with the sustainability of MFIs. The above studies highlight that the impact of ROA on the sustainability of MFIs provide mixed results.

2.6.2 Return on Equity

According to Ledger wood (1999), the ratio of return on equity (ROE) helps investors and manager to identify earning on their invested equity. ROE differs from ROA as it measures the return on funds owned by MFIs, instead of total assets. Moreover, managers should be careful if the inflation rate is higher than ROE as it reduces the equity of MFIs over the year. Furthermore, it is critical for investors as it calculates the profit on the investments(Rahman & Mazlan, 2014b).

Currently, ROE is a vital indicator for MFIs that are seeking private investments. The variation in ROE for MFIs largely depend on their capital structure. MFIs that are more dependent on their equities show a lower ROE than those that use liabilities to fund their assets. Since MFIs are advancing towards banks and banking institutions, these structures allow MFIs to enter into the capital market to generate funds for operations (Armendáriz de Aghion & Morduch, 2000).

Indeed, in April 2007, Compart Amos Banco Mexico introduced their shares of USD 467 million in the share market (Malkin, 2008). In 2008, AIG investment fund announced its investment in Blue Intercontinental Micro Finance Bank (Micro, 2008). Similarly, SKS MFI Ltd, India viewed their shares demand in the stock market (Wall Street, 2010). Furthermore, in February 2010, Standard Chartered Bank and the Grameen Foundation initiated a conference to play their role to aware the audience about "best practices for structuring their operations to attract and manage commercial financing, including advice on securing equity funding and managing debt financing" (Newswire, 2010).

The above examples depict the interest of MFIs towards capital markets. Microfinance Information Exchange (MIX) database 2010 reported that out of 1084 MFIs, 38 percent have designated as a for-profit (Campbell & Rogers, 2012). Results hugely differ from 1999 data when out of 57 MFIs 23 percent were confirmed as for- profit. Therefore, it is critical to evaluate the influence of ROE in MFIs performance.

ROE has been keen fund source for entrepreneurs. Campbell and Rogers (2012) investigated the determinants of ROE to understand it further. Moreover, researchers have been emphasizing on MFIs to become independent of grants and donation to attain sustainability. Therefore, it is critical for MFIs to find the alternate source of the fund from capital markets (Bogan, 2008).

Moreover, only a few studies have focused on the relationship of ROE with MFIs sustainability. Campbell and Rogers (2012) reported that ROE is important as it replaces grants with investors fund, helping MFIs to be self-sufficient. Furthermore, Sanfeliu *et al.*

(2013) found that ROE has a significant correlation with the performance of MFIs. The study used a Spearman correlation analysis to identify the determinants of financial performance.

Tucker and Miles (2004) argued that there is a possibility that MFIs having positive ROE and self-sufficiency are not focusing on the real poor people. So, there is a possibility that emphasizing on positive ROE would result in the trade-off. Equity investors would force MFIs to decrease the cost of loans by focusing on less poor clients, which would lead to deviation from the social mission of outreach. Since, MFIs are currently trending towards rural banks and non-bank financial institutions (Armendáriz de Aghion & Morduch, 2000). Therefore, these organizational forms or structures allow MFIs to enter the capital market to generate funds for operations.

Table 2.2
Summary of literature on Profitability

Author (s)	Sample period	Objective	Findings or results
Ayayi and Sene (2010)	217 MFIs, 101 countries (1998-2006)	"To identify factors that determine sustainability of MFIs"	Profitability has a significant correlation with MFIs sustainability
Bhanot *et al.* (2015)	81 MFIs in India (2010)	"To develop index and determine the factors affecting sustainability"	ROA significantly affect MFIs sustainability.
Campbell and Rogers (2012)	689 MFIs on MIX market (2007)	"The factors of ROE for MFIs"	ROE significantly affect MFIs self-sufficiency
CGAP (2003)		This document provides ratios for measuring MFIs performance	ROA and ROE are significant contributors towards the performance of MFIs.
Daher and Le Saout (2015)	370 MFIs on MIX market (2005-2011)	"To determine the indicators of financial performance of MFIs"	Profitability significantly affect MFIs performance
Louis and Baesens (2013)	456 MFIs, MIX market (1995-2010)	Two types of possible improvements in pursuing profitability are studied	Profitability is negatively linked to outreach.
Wijesiri *et al.* (2017)	420 MFIs Mix market (2013)	"To investigate the effects of age and size on financial and social efficiency estimates of MFIs."	ROA significantly impact financial efficiency. ROA has an insignificant impact on social efficiency.
Tucker and Miles (2004)	14 African, 16 Asian, 72 Latin America, and 10 European banks (2001)	Comparing FSS and no-FSS MFIs with commercial banks in developing countries	ROA and ROE have a positive correlation with FSS.
Lebovics and Hudon (2014)	28 MFIs, Vietnam (2011)	"To analyze whether financial and social efficiency are mutually exclusive"	ROA has insignificant relation with financial efficiency.
Zeller and Meyer (2002)		The triangle of Microfinance	MFIs normally take 5-6 years to have a positive ROA
Mia and Lee (2017)	169 MFIs, Bangladesh (2009-2014)	"This study aims to identify the factors of mission drift, with special emphasis on the role of funding sources".	ROA has a significant negative relationship with outreach.

2.7 Portfolio Quality and Sustainability

MFIs provide funds for poor people who are unable to provide collateral. These loans are considered as high risk, and it is tough to manage these portfolios. It is critical to analyze the quality of the loan portfolio as it is the biggest risk for any MFI (Von Stauffenberg *et*

al., 2003). The widely used measure for portfolio quality in the MFIs sustainability literature is portfolio at risk greater than 30 days.

2.7.1 Portfolio at Risk >30 Days

Portfolio at risk is the most commonly used and acceptable proxy of portfolio quality (CGAP, 2003). The core business for MFIs is to provide loans to poor people, and interest earned from these loans is their main earning source (Kar & Swain, 2014a; Rosenberg, 1999). The revenues generated from these loans is mainly dependent on their portfolio quality. Among other things, the portfolio quality is determined by interest and principal amount obtained from loan disbursement. Therefore, MFIs management needs to monitor its loan portfolios to avoid losses keenly.

The risk attached with the loan increase due to the increase in the number of days the loan remains outstanding after the due date which is commonly known as a loan at risk. According to CGAP (2003), portfolio at risk is the "outstanding amount of loans that have one or more installments of principal past due certain number of days." Portfolio at risk is measured by dividing the unbalance principal amount due for a certain number of days by its gross loan portfolio (GLP). MFIs that have a higher portfolio at risk are considered inefficient in the collection or have a poor policy for loan recovery.

Portfolio at risk greater than 30 days (PAR>30) is used to measure the quality of loan portfolio at risk greater than 30 days (Adhikary & Papachristou, 2014; Von Stauffenberg *et al.*, 2003). According to Nanayakkara (2012), if institutions are unable to recover the

amount of loan within due date than the loan portfolio is considered to be at risk. There is a possibility that loan does not help the poor to overcome poverty and they default. As loan default get older, their chances of recovery decreases. Furthermore, if 10 percent or more of the loan overdue exceeds 30 days, MFIs would suffer problem as they have no collateral against them (Von Stauffenberg *et al.*, 2003).

Researchers have also argued that the risk of loan default not be associated with the lending loan to the poor (Adhikary & Papachristou, 2014). In Bangladesh, Grameen Bank has been lending to very poor people including females, and their recovery rate of the loan is good (Wahid, 1994). Conning (1999) claims that repayment of the loan can be enhanced by the random visit of staff to the borrowers and by exerting social pressure to avoid default. Besides, D'espallier *et al.* (2011) suggest that female borrowers are good at repayments of their credits.

Several studies are found in the literature that has studied the impact of PAR>30 on the sustainability of MFIs. Ayayi and Sene (2010) found that PAR has a negative relationship with the FS of MFIs. Data used for the study was obtained for the period 1998 to 2006 of 217 MFIs working in 101 countries. The objective of the study was to identify the impact of managerial determinants of sustainability. Moreover, Crabb (2008) also found (PAR>30) significantly affect the sustainability of MFIs in developing countries.

Tehulu (2013) also found that PAR > 30 days have a negative correlation with MFIs financial sustainability. Several other empirical studies also examined the impact of

PAR>30 days on MFIs sustainability and found a negative relationship among them (Daher & Le Saout, 2015; Kar & Swain, 2014b; Nwachukwu, 2014).

Contrary to the above findings, Schäfer and Fukasawa (2011) conducted a study to examine the factors affecting the sustainability of MFIs. Their results showed that portfolio at risk is insignificant while measuring sustainability. Additionally, Kar (2012) also found that PAR>30 have an insignificant relationship with the sustainability of MFIs. The objective was to investigate the impact of financing and capital structure on MFIs performance. Data for the study was obtained from the year 2000-2007 of 782 MFIs working in 92 countries, and GMM estimation technique is used for analysis.

Table 2.3
Summary of literature on Portfolio quality

Author (s)	Sample period	Objective	Findings or results
Ayayi and Sene (2010)	217 MFIs, 101 countries (1998-2006)	To identify factors that determine sustainability of MFIs	Portfolio quality have a significant correlation with MFIs sustainability
Bhanot *et al.* (2015)	81 MFIs in India (2010)	To develop index and determine the factors affecting sustainability	PAR>30 days affect Indian MFIs sustainability.
CGAP (2003)		This document provides ratios for measuring MFIs performance	Portfolio quality is the key determinant of MFIs performance.
Haq *et al.* (2010)	39 MFIs in Africa, Asia and Latin America (2004)	Examining MFIs cost efficiency using data envelopment analysis	Portfolio quality negatively impacts MFIs efficiency.
Nanayakkara (2012)	232 MFIs on CGAP (2004)	Issues in criteria for identifying MFIs performance and proposing new method	Portfolio quality significantly impact MFIs performance
Nyamsogoro (2010)	98 MFIs in Tanzania (2004- 2007)	To identify the drivers of MFIs sustainability in Tanzania.	PAR>30 days have a significant correlation with MFIs sustainability.
Tehulu (2013)	23 MFIs in East Africa (2004-2009)	"To investigate the determinants of MFI financial sustainability"	PAR>30 days have a negative correlation with MFIs sustainability.
Zaigham and Asghar (2011)	3 Microfinance banks in Pakistan (2010)	To identify the sustainability level of MFIs in Pakistan	Loan portfolio quality affect MFIs sustainability
Schäfer and Fukasawa (2011)	500 MFIs, (2006) 500 MFIs (2008)	"To determine factors best describing MFIs operational self-sufficiency"	PAR>30 has no significant impact on sustainability
Kar (2012)	782 MFIs, 92 countries (2000-2007)	"This paper aims to explore the impact of capital and financing structure on the performance of MFIs"	PAR>30 has no significant impact on sustainability

2.8 Productivity and Sustainability

The productivity measure indicates how well MFIs utilizes their staff to improve repayment of the loan, reduce their expenditure and increase their income. According to CGAP (2003), "the productivity measure indicates how efficient an MFIs is in using its resources." Furthermore, the productivity of MFIs staff has a significant role in achieving profitability and sustainability. The most widely used indicator of productivity is borrower per staff member (Rauf & Mahmood, 2009).

2.8.1 Borrower per Staff Member

According to Adhikary and Papachristou (2014), and Hudon and Traca (2011), borrower per staff member (BPSM) is the proximate measure to determine the productivity of microfinance institutions. It measures the number of loans managed by each staff member. The NAB is used in the numerator and the total number of employees in the denominator. NAB is preferred over a number of loans because they are better in determining the workload. Thus BPSM is preferred over loan officer productivity as several duties assigned to loan officers and other branch staff usually overlap (Nyamsogoro, 2010). Furthermor, CGAP (2003) define staff productivity as a ratio that measures the efficiency of MFIs in utilizing their staff to manage their clients and increase revenue. BPSM positively relates to the efficiency of MFIs in utilizing its human resource.

According to Bruett *et al.* (2005), it is vital to measure staff productivity, as MFIs staff is responsible for managing all their clients including depositors, borrowers, and other clients. Staff productivity may also vary depending upon the nature of loans, loan disbursement methods, the frequency of loans, and the terms and conditions of the product. Additionally, it may also be affected by the ease of access to borrowers, population density and local environment (Bruett *et al.*, 2005). Furthermore, it is important to closely monitor staff productivity to ensure that gains associated with it are not achieved at the expense of asset and portfolio quality.

Some explanation about identifying the borrower is important to discuss. Each loan disbursed is considered as one borrower. If a solidarity loan is disbursed among six

members, the number of borrowers will be considered as six. However, if an individual has availed two or three loans, it is considered as one borrower. Moreover, consumer and pawn loans are not included due to less analysis, and screening is required for them. Furthermore, the total staff is measured by the number of employees working in MFIs with full duty time. Contractual staff and part-time staff having a significant workload distribution with full-time employees are also considered. For every two workers managing half duty time, is considered as one staff (Von Stauffenberg *et al.*, 2003).

Managers should see a positive trend in the productivity ratio (Bruett *et al.*, 2005). When the BPSM ratio is high, it shows that MFIs are more productive. On the flip side, it may also be considered that low BPSM ratio may not necessarily be due to inefficient staff. Instead, some internal issues such as market saturation, excess paperwork, complex procedures, remote areas working may also affect productivity. Furthermore, the BPSM ratio varies among MFIs depending upon their business plan. Therefore, the ratio determines the significance of the rules and policies adopted by MFIs to execute its operations.

Nwachukwu (2014) concluded that BPSM has a positive influence on the sustainability of MFIs. While explaining factors that determine financial sustainability of Tanzanian MFIs, Nyamsogoro (2010) has studied BPSM as possible explanatory factors. The effect of staff productivity on financial sustainability and outreach of the MFIs was studied by Nyamsogoro (2010).

Ferro-Luzzi and Weber (2006) estimated a seemingly unrelated regressions model to assess the determinants of the performance. Their results for the year 2003 show that staff productivity is among the most significant determinant of financial performance. On the flip side, Crabb (2008) found staff productivity has an insignificant influence on the OSS of MFIs across the developing nations.

Table 2.4
Summary of literature on Productivity

Author (s)	Sample period	Objective	Findings or results
Bhanot *et al.* (2015)	81 MFIs in India (2010)	To develop index and determine the factors affecting sustainability	Borrower per staff member affects Indian MFIs sustainability.
CGAP (2003)		This document provides ratios for measuring MFIs performance	Productivity is used to determine the performance of MFIs.
Kumar Kar (2011)	426 MFIs, 81 Countries (2005-2007)	To identify the drivers of MFIs sustainability in Bangladesh	staff productivity has a positive impact on sustainability
Ferro-Luzzi and Weber (2006)	45 MFIs, Geneva, 1999-2003	"This paper illustrates how some statistical tools can offer new insights in the context of MFIs performance evaluation"	staff productivity has a positive impact on sustainability
Nyamsogoro (2010)	98 MFIs in Tanzania (2004-2007)	To identify the drivers of MFIs sustainability in Tanzania.	Staff productivity has a significant correlation with MFIs sustainability.
Nwachukwu (2014)	426 MFIs, 41 countries (2004-2008)	How institutional design and interest help MFIs to achieve FSS.	Staff productivity has a positive influence on FSS.
M. A. Rahman and Mazlan (2014a)	5 MFIs in Bangladesh (2005-2011)	To investigates the drivers of financial sustainability of MFIs in Bangladesh.	Staff productivity has a positive impact on sustainability
Crabb (2008)	511 MFIs, 90 countries (2000-2004)	"This study looks at the relationship between the success of MFIs and the degree of economic freedom in their host countries."	BPSM has an insignificant relationship with sustainability.

2.9 Efficiency and Sustainability

Efficiency refers to attaining more output at the same level of input. In MFIs, Woller (2002) defines efficiency as the most effective way of delivering small loans to poor people. Operating expense ratio is the most widely used proxy for measuring the efficiency of MFIs

(Daher & Le Saout, 2015; Ngo *et al.*, 2014). The measure of efficiency indicates that more the output at a given level of input the better the contribution toward sustainability (Nyamsogoro, 2010).

2.9.1 Operating Expense Ratio

Operating expense ratio (OER) is measured by dividing the cost of all operations by average GLP (Stauffenberg *et al.*, 2003). According to CGAP (2003), OER measures the efficiency of MFIs management in reducing its operating cost for the loan portfolio. Since MFIs have a core target of providing small loans to the poor people in both rural and urban areas, their cost of operations is relatively high. MFIs that have lower OER are considered more efficient. Furthermore, it is important to mention here that, operating expense includes staff salaries and administrative expenses.

According to Nanayakkara and Mia (2012), MFIs that are efficient in managing their operations, are better able to achieve their mission as it leads to satisfied borrowers and donors. For instance, MFIs that are efficient in operations attract more donors to provide funding's which help them to achieve their poverty outreach mission and improve performance. Additionally, operationally efficient MFIs tends to have more savings, charge lower interest rate and can serve extremely poor borrowers.

Moreover, several case studies have highlighted that the efficiency of MFIs varies depending upon the funding sources. Getubig *et al.* (2000) revealed that the efficiency of MFIs that are self-sufficient is one-third of the efficiency of MFIs which are dependent on

donor funds. Furthermore, Ayayi and Sene (2010) also highlighted that MFIs with sound management practices usually have lower OER and are more financially sustainable. Additionally, for MFIs in Latin America, operating efficiency is also improved by growth in number of clients and lending methods (Battilana & Dorado, 2010).

Studies were done to investigate the elements of profitability and found that OER has a negative correlation with MFIs performance (Bourke, 1989). Similarly, Pasiouras and Kosmidou (2007) and Zopounidis and Kosmidou (2008) also concluded that efficiency and profitability have a negative relationship. However, Molyneux and Thornton (1992) argued that higher expenditures might increase profits of the organization due to more expenditures on the productive human resource.

MFIs efficiency is dependent on the quality of GLP, the ratio of the outstanding loan, income from interest and fee and expenses of operational activities (Gutierrez-Nieto *et al.*, 2007). Later, Haq *et al.* (2010) argued that increased focus on the efficiency level of MFIs might result in an increase in overdue loans which affects sustainability in the long run. The study used envelopment data analysis to investigate the efficiency of 39 MFIs in Latin America, Asia, and Africa. Kar and Swain (2014b) also found that OER negatively influences MFIs sustainability. The objective was to investigate the incidence of the high rate of interest on the rate of repayment, profitability and mission drift. Data of 379 MFIs from MIX market for the year 2003 to 2008 including 71 countries were evaluated. According to Rai and Rai (2012), OER significantly influences MFIs OSS. The study was based on identifying the factors which influence MFIs financial sustainability.

Table 2.5
Summary of literature on Efficiency

Author (s)	Sample period	Objective	Findings or results
Bourke (1989)	90 banks, 12 countries (1972-1981)	To investigate the elements of bank profitability in context of expense preference behavior theories	Operating expense have a negative impact on profitability
Daher and Le Saout (2015)	370 MFIs on MIX market (2005-2011)	To determine the indicators of financial performance of MFIs	The efficiency of MFIs is the critical determinants of performance
Hudon and Traca (2011)	71 MFIs on Planet Rating (2002-2005)	To investigate the effect of subsidy intensity on MFIs efficiency	Subsidies have a positive impact on efficiency which leads to MFIs sustainability
Kumar Kar (2011)	426 MFIs, 81 Countries (2005-2007)	To identify the drivers of MFIs sustainability in Bangladesh	Operating expense ratio has a negative correlation with sustainability.
Ngo et al (2014)	MIX market (1997-2012) for a cross-country analysis	Investigate the link between efficiency, the scale of operation and MFIs sustainability	Efficiency has a negative correlation with sustainability
Nyamsogoro (2010)	98 MFIs in Tanzania (2004- 2007)	To identify the drivers of MFIs sustainability in Tanzania.	Efficiency has a significant correlation with MFIs sustainability.
M. A. Rahman and Mazlan (2014a)	5 MFIs in Bangladesh (2005-2011)	To investigates the drivers of financial sustainability of MFIs in Bangladesh.	Operating expense ratio has a negative correlation with sustainability.
Rai and Rai (2012)	52 MFIs of India, and Bangladesh from (2005-06 to 2009-10)	To develop index and determine the factors affecting sustainability	Operating expense ratio significantly affect sustainability
Tehulu (2013)	23 MFIs in East Africa (2004-2009)	To investigate the determinants of MFI financial sustainability	Operating expense ratio has a significant negative correlation with MFIs financial sustainability.
Tucker and Miles (2004)	14 African, 16 Asian, 72 Latin America, and 10 European banks (2001)	Comparing FSS and no-FSS MFIs with commercial banks in developing countries	Operating cost has a negative correlation with FSS.

2.10 Liability Management and Sustainability

Liability management represents organizations ability to repay their loans by utilizing their equity (Von Stauffenberg *et al.*, 2003). Even though financial management is a back-office function, decisions in this area can directly affect the bottom line of the institution. If MFIs fail to manage their liquidity position, they would not be able to manage their credit operations efficiently. Moreover, it becomes more critical for MFIs which are utilizing

their depositor savings. Furthermore, irregular use of equity may result in financial risk for MFIs. Due to the high risk involved with the management of liabilities, debt to equity ratio is deemed to be an important determinant of sustainability.

2.10.1 Debt to Equity Ratio

The debt to equity ratio (DER) determines capital adequacy as it measures institutions overall leverage (Von Stauffenberg *et al.*, 2003). It is critical for credit providers because it describes the loss absorption capacity of the institution. MFIs usually does not have a high DER because they are unable to attract commercial lending. However, when MFIs transform into formal institutions or banks their DER rises (Von Stauffenberg *et al.*, 2003). DER varies across MFIs depending on their ability to carry a risk for a given equity. Normally, MFIs maintain low DER because their portfolio of loans has no backup collateral when compared with commercial institutions.

According to Bruett *et al.* (2005) "DER indicates the safety cushion the institution has to absorb losses before creditors are at risk." It is also known as leverage ratio and determines the ability of MFIs to borrow funds against its equity. Although, this ratio is of more importance to lenders and investors at a given point of time, highly leveraged MFIs should closely monitor the fluctuation in their DER as it provides a clear picture of risk. According to Bruett *et al.* (2005), non-commercial MFIs have lower DER when compared with deposit-taking MFIs.

Researchers have found a mixed result on the relationship between profitability and MFIs leverage. Several researchers have come up with a positive correlation with the level of

debt and organizations performance (Berger & Di Patti, 2006; Roden & Lewellen, 1995). However, other researchers found a negative correlation between the level of debt and organizations performance (Booth *et al.*, 2001; Rajan & Zingales, 1995; Wald, 1999). Contrary to the above, Kinde (2012) suggest an insignificant relationship.

Uwalomwa and Uadiale (2012) and Abor (2005) further investigated the impact of both short and long term loan on the performance of institutions. Data was studied using 31 firms from the year 2005 to 2009. Results suggested management to focus on short-term loans due to their positive effect on performance. They argued that short-term loans be usually less expensive which increase firm performance. Long term loans are costly and negatively influence firm performance. Abor (2005) also concluded the same results.

Results of the study by Tehulu (2013) shows that DER has a negative coefficient, but they are found significant statistically at 5 percent. These results are mainly due to the practice of utilizing MFIs equity without paying dividends to equity holders. Several other researchers also concluded a negative correlation between debt level and performance of the firm (Booth *et al.*, 2001; Rajan & Zingales, 1995; Wald, 1999).

However, Wijesiri *et al.* (2017) result suggests that DER has an insignificant relationship with MFIs financial efficiency. This implies that DER does not contribute to MFIs financial efficiency. Additionally, Abdulai and Tewari (2017) also found that DER has an insignificant relationship with the sustainability of MFI. Henceforth, the importance of liability management and its possible impact on sustainability is not only appropriate but is necessary to formulate effective policies. Moreover, most MFIs have shifted from donor

dependence to accessing capital from capital markets which necessitate the need to study the impact of DER on sustainability.

2.11 Gross Loan Portfolio and Sustainability

According to CGAP (2003), GLP is a gross measure of all loans which are outstanding with the borrowers. These include restructured, delinquent and current loans but exclude interest receivable and loan write-off.

In his study, Gutierrez-Nieto *et al.* (2007) concluded that GLP, have a positive correlation with MFIs efficiency. Instead of using traditional ratios, this study used envelopment data analysis to find the critical elements of efficiency. The study investigated 30 MFIs for the year 2003 in Latin America.

Saeed (2014) evaluated the factors which determine MFIs success. He concluded that GLP is critical for MFIs success. Daher and Le Saout (2015) also supported that GLP has a significant positive correlation with MFIs sustainability. Furthermore, Nwachukwu (2014) investigated the impact of GLP, the productivity of staff, ALPB and MFIs size on FSS and found a positive relationship. However, the study concluded that yield and PAR>30 days negatively impact sustainability. The objective of the study was to investigate the relationship between firm design and the interest rate on the FSS of MFI.

Moreover, Ngo *et al.* (2014) had also obtained the same result when empirically investigated the relationship of operational scale and MFIs sustainability. Results suggested a positive correlation between GLP, and MFIs OSS, thus sustainability. Abdulai

and Tewari (2017) found that GLP had a positive and statistically significant coefficient. Since GLP is the main income source for most MFIs, a higher loan portfolio, therefore, if well managed, with improved loan recovery, should lead to increased profits and hence sustainability of the institution. This finding is consistent with Tehulu (2013) but contradicts that of Okumu (2007) who found a negative impact of loan portfolio on MFIs sustainability.

Table 2.6
Summary of literature on Liability management

Author (s)	Sample period	Objective	Findings or results
Bhanot et al. (2015)	81 MFIs in India (2010)	To develop index and determine the factors affecting sustainability	Gross loan portfolio significantly affects MFIs sustainability.
Conning (1999)	72 MFOs worldwide by MBB (1998)	How to be financially sustainable while maximizing outreach?	Leverage significantly affect sustainability.
CGAP (2003)		This document provides ratios for measuring MFIs performance	DER is important to determine the performance of MFIs.
Daher and Le Saout (2015)	370 MFIs on MIX market (2005-2011)	"To determine the indicators of financial performance of MFIs"	Gross loan portfolio significantly impacts MFIs performance.
Kumar Kar (2011)	426 MFIs, 81 Countries (2005-2007)	"To identify the drivers of MFIs sustainability in Bangladesh"	DER has a negative correlation with sustainability.
Kyereboah-Coleman (2007)	52 MFIs from Ghana (1995-2004)	"To investigate the effect of capital structure on MFIs performance"	DER has a positive relationship with MFIs performance.
Rahman and Mazlan (2014a)	5 MFIs in Bangladesh (2005-2011)	"To investigates the drivers of financial sustainability of MFIs in Bangladesh."	DER has a negative correlation with sustainability.
Tehulu (2013)	23 MFIs in East Africa (2004-2009)	"To investigate the determinants of MFI financial sustainability."	The gross loan portfolio has a significant negative correlation with MFIs financial sustainability.
Bogan (2012)	MIX level 3 rating MFIs, with assets of $1.3 million (2003-2006)	"To identify how changes in capital structure affect MFI sustainability and efficiency."	The capital structure has a significant correlation with sustainability.
Zaigham and Asghar (2011)	3 Microfinance banks in Pakistan (2010)	To identify the sustainability level of MFIs in Pakistan	Gross loan portfolio significantly affects MFIs sustainability in Pakistan
Wijesiri *et al.* (2017)	420 MFIs Mix market (2013)	"To investigate the effects of age and size on financial and social efficiency estimates of MFIs."	DER and sustainability of MFIs are not linked significantly.
Abdulai and Tewari (2017)	71 MFIs, 10 countries, Mix market	"To examine the relationship between outreach and sustainability in the context of sub-Saharan Africa and analyses the determinants of sustainability"	DER and sustainability of MFIs are not linked significantly.

2.12 Moderating Effects

A theoretical review of the study suggests that age and size of MFIs may have the moderating effect on the relationship between profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio and sustainability of MFIs.

2.12.1 Age of Microfinance Institutions

Sustainability of MFIs is also influenced by its age (Kipesha, 2013). Age usually refers to the time MFIs is in operation from its starting date. Robinson (2001) depicts that MFIs which are having an age of more than six years have FSS of 102 percent. Similarly, MFIs whose age is more than three but less than six years have FSS ration of 86 percent. Moreover, new MFIs with age below three years have FSS ratio of 69 percent. This implies that age is related to the level of MFIs sustainability (Robinson, 2001). Bogan *et al.* (2007) and Cull and Morduch (2007) further concluded a direct relationship between age and financial sustainability.

According to the studies by Bogan (2008), Cull and Morduch (2007) and Oteng-Abayie *et al.* (2013), age of microfinance institutions have a positive correlation with efficiency, profitability, and sustainability. According to Ayayi and Sene (2010), outreach and MFIs age have positive relation but are less significant towards financial sustainability. On the other hand, the age of MFIs hurt the financial self-sustainability of MFIs in Bangladesh (Rahman & Mazlan, 2014b). Contrary to Bogan *et al.* (2007), Cull and Morduch (2007) and Gonzalez (2007a), results by Kyereboah-Coleman and Osei (2008) concluded the insignificant relationship between age and sustainability.

The result shows that the experience of the firm increases with microfinance institution's efficiency, sustainability and revenue generation capacity but results in declining profitability (Kipesha, 2013). The study findings on the relationship of age to profitability were contrary to most of the findings in microfinance institutions such as Cull and Morduch (2007), Bogan (2008) and Wale (2009) that found a positive influence of age on profitability. Contrary to them, the findings by Gutierrez-Nieto *et al.* (2007) found the insignificant relationship among the age of MFIs and profitability.

The productivity level of the firm is fixed at inception which grows with age (Jovanovic, 1982). When MFIs grow, they face high customer demand and more competition in the market which also affect the level of firms productivity (Coad *et al.*, 2010). Another concept also relates MFIs age with performance and is termed as "learning by doing effects." According to this idea, when MFIs spend time in the market, they tend to learn new techniques and innovations which help them increase their level of productivity (Vassilakis, 2008).

Outreach and efficiency are also related to the age of MFIs during the first few years (Cull & Morduch, 2007; Gonzalez, 2007a). Kipesha (2013) investigated the influence of age and size on MFIs performance in Tanzania using data for 30 MFIs. Findings concluded that age of the firms which indicates organizations experience have a positive correlation with sustainability and efficiency but a negative relationship with profitability (Kipesha, 2013). Results were also consistent with some studies in microfinance institutions such as Wale (2009) and Oteng-Abayie *et al.* (2013). Ericson and Pakes (1995) also supported that as

MFIs spend more time, they tend to learn more from their experience which increases their efficiency.

Kyereboah-Coleman (2007) highlighted that as MFIs tend to get mature, they become more experienced, efficient in operations, effectively mobilize their resources, and are more competitive. Furthermore, the financing needs of the MFIs also vary with age. During the initial stage, MFIs are more dependent on subsidies and donor funds. As MFIs tend to get old, their financing needs changes. Mature MFIs usually can acquire commercial funds and attract investments. Furthermore, mature MFIs can acquire debt and loans from the market due to their goodwill and legitimacy. Kipesha and Zhang (2013) further endorsed that mature MFIs have more knowledge about the market, efficient operations, funding sources, competitive edge, and have more value among the borrowers which provide a competitive edge and leads them towards sustainability.

2.12.2 Size of Microfinance Institutions

MFIs size is usually determined by the value of its total assets (Bogan *et al.*, 2007; Hartarska, 2005; Hermes *et al.*, 2011; Lafourcade *et al.*, 2005; Mersland & Strøm, 2008, 2009). Cull and Morduch (2007) claims that MFIs performance is dependent on its size. They argued that large microfinance banks usually have lower outreach (Cull & Morduch, 2007). The reason is that large MFIs are more motivated towards increased profits which affect the outreach to the poor.

Kipesha (2013) study show the presence of the positive impact of firm size and NAB on the sustainability of MFIs in the country. Their findings were also consistent with some previous findings in microfinance sector such as the study by Wale (2009), Cull and Morduch (2007) and Kyereboah-Coleman (2007). The study also found a positive impact of the firm size on firm revenue generation capacity indicating that as firm size increases its revenue generation capacity also increases. The finding of the study was consistent with some previous studies such as Kyereboah-Coleman (2007) that also report a positive correlation between firm size and the yield on loans.

However, researchers argued that it is not always important that firm size is advantageous towards performance. Tripsas and Gavetti (2000) claimed that some bigger firms are influenced by operational, technological and bureaucratic rigidities. Big firms are also resistant to enter into new markets. This affects the performance of larger firms. Several other researchers such as van der Weerdt *et al.* (2006), Sanchez Diaz and Sánchez (2008), Ramasamy *et al.* (2005) and Crawford *et al.* (2014) also supported the same results. On the other hand, Wale (2009) found a significant positive correlation between size and MFIs sustainability in Ethiopia. The result was in line with results by Kyereboah-Coleman (2007), Mersland and Strøm (2009) and Bogan *et al.* (2007). On the flip side, Hartarska (2005) concluded an insignificant relationship between size and MFIs sustainability.

Crawford *et al.* (2014) found that smaller microfinance institutions have more profitability level than larger MFIs indicating a negative relationship between size and performance. However, Kyereboah-Coleman and Osei (2008) found a significant positive correlation

between MFIs size and profitability. The study focused on MFIs in Ghana to determine the relationship between MFIs size and sustainability.

Cull and Morduch (2007) argued that there is a need to disaggregate data to study the relationship between large MFIs and the number of poor people served. Collecting disaggregated data is tough. Therefore, their study determines the relationship between outreach and profitability. Several other researchers have also investigated the correlation between MFIs size and profitability (Hermes *et al.*, 2011; Hishigsuren, 2007; Kyereboah-Coleman & Osei, 2008; Lafourcade *et al.*, 2005; Mersland & Strøm, 2008, 2009; Schreiner, 2000). Several other researchers have measured the relationship of size with its outreach (Bogan *et al.*, 2007; Hartarska, 2005; Hermes *et al.*, 2011; Lafourcade *et al.*, 2005; Mersland & Strøm, 2008, 2009).

According to Kyereboah-Coleman (2007), the size of microfinance institutions tells about its ability to formalize procedures and structures which are important to ensure the performance of the firms, especially in the repayment perspective. Large size enables MFIs to access more credit from the market, possess more skilled human resource and have diversified structure about small MFIs (Yang & Chen, 2009).

According to Kipesha (2013), the size of MFIs also relates to efficiency. Economies of scale enable large MFIs to control their operating cost. Bassem (2008) stated that MFIs efficiency is negatively related to size. However, size and sustainability are linked positively. Furthermore, Nyamsogoro (2010), Bogan (2008), Mersland and Strøm (2008)

and Cull and Morduch (2007) argued that large firms have cost benefits as compared to small firms and found that MFIs are having large size perform better.

Ramasamy *et al.* (2005) stated that several advantages are associated with the scale of the firm. Large size firms make it difficult for new businesses to enter the market. Furthermore, they can get more commercial financing which further increases their productivity. Large companies can also easily negotiate with customers and suppliers, can maintain skilled human resource and easily access credit from the market (Yang & Chen, 2009).

The size also indicates the growth of microfinance institutions regarding client base; the working area covered as well as assets owned. As in other business firms, the size of microfinance institutions is essential for acquiring commercial financing, use of modern technology and innovations. The size also influences managers of microfinance institutions in implementing different operations and growth strategies such as internal control, revenue enhancement, geographical coverage as well as an internal decision regarding the use of resources.

Table 2.7
Summary of literature Age and Size of MFIs

Author (s)	Sample period	Objective	Findings or results
Ayayi and Sene (2010)	217 MFIs, 101 countries (1998-2006)	"To identify factors that determine sustainability of MFIs"	MFIs age has less impact on sustainability.
Kumar Kar (2011)	426 MFIs, 81 Countries (2005-2007)	"To identify the drivers of MFIs sustainability in Bangladesh"	MFIs size has positive, and age has a negative correlation with sustainability.
Zopounidis and Kosmidou (2008)	23 Banks, Greece (1990-2002)	"To examine the determinants of performance of Greek banks"	The size of the banks affects the performance regarding ROA.
Ngo et al. (2014)	MIX market (1997-2012) for a cross-country analysis	"Investigate the link between efficiency, the scale of operation and MFIs sustainability"	The size of MFIs has a positive correlation with sustainability.
Islam et al. (2014)	215 MFIs in Bangladesh (2009)	"To identify the effect of size, interest rate spread administrative and financial cost on OSS."	Size of MFIs has an insignificant relationship with OSS
Kipesha (2013)	30 MFIs in Tanzania for five year	"To investigate the effect of age and size on MFIs performance"	• Age negatively impact profitability. • The size positively impacts MFIs performance. • Age positively correlate with efficiency, financial revenue, and sustainability.
Bogan (2012)	MIX level 3 rating MFIs, with assets of $1.3 million (2003-2006)	"To identify how changes in capital structure affect MFI sustainability and efficiency"	Size has a significant correlation with sustainability.
Wale (2009)	16 MFIs in Ethiopia (1998-2007)	"To investigate the performance of MFIs in Ethiopia"	• Size of MFIs has a positive correlation with the sustainability of MFIs. • Age of MFIs has a significant correlation with efficiency, productivity, sustainability and PAR>30 days.
Gonzalez (2007)	1,003 MFIs on MIX (1999-2006)	To explore determinants of MFIs costs	Age has a positive correlation with efficiency.

2.13 Underpinning Theory

Sustainability of MFIs is a multidimensional construct based on the double-bottom line. It is important to mention here that sustainability is not a one-time process but is achieved over time. As MFIs evolve, capital and funding structure changes, leverage increases, and sources of the fund become more diverse which leads towards sustainability. MFIs evolution stages are divided into young, growth and maturity stage (Bogan, 2012).

At the young stage, MFIs start as NGOs with a social vision, funding operations with grants and concessional loans from donors and international financial institutions that effectively serve as the primary sources of capital for the microfinance sector (Bogan, 2012). At this stage, MFIs have the least ability to raise debt financing. They face several challenges including lack of experience, credit history, collateral, and capacity to develop commercial ties with private lenders (DeSousa-Shields & Frankiewicz, 2004). The dependence of MFIs on grants and donor subsidies shows that these institutions are financially unsustainable at this stage.

At the growth stage, NGOs transform into newly regulated MFIs as required by financial regulators. These newly transformed MFIs are able to attract equity partners to cover their financing needs. Additionally, private sources of debt are also available for MFIs that become regulated. At this stage, MFIs have the ability to offer collateral, improved experience, and a track record of attracting commercial lenders. Majority of MFIs at this stage are still struggling, and only a few of them achieve sustainability.

Mature MFIs usually acquire commercial funds and attract investments and acquire debt and loans from the market due to their goodwill and legitimacy. These MFIs actively manage their liabilities to maximize profitability and minimize liquidity risk. Moreover, "Learning by doing" is the key to improved sustainability which is achieved as MFIs evolve. The same has been highlighted by Kyereboah-Coleman (2007) that mature MFIs are more experienced, have higher operational efficiency, effectively mobilize their resources, and are more competitive. Kipesha and Zhang (2013) further endorsed that mature MFIs have more knowledge about the market, efficient operations, funding sources, competitive edge, and have more value among the borrowers which provide a competitive edge and leads them towards sustainability. Robinson (2001) depicts that MFIs which are having an age of more than six years have achieved 102 percent sustainability. Similarly, MFIs whose age is more than three but less than six years have sustainability rate of 86 percent. Moreover, young MFIs with age below three years are only 69 percent sustainability. Note that overall sustainability is achieved only if MFIs succeed in attaining 100 percent sustainability. The above discussion highlights that MFIs sustainability may best be explained over the life cycle of the firm using "Life Cycle Theory." Henceforth, this thesis has used only the Life cycle theory as an underpinning theory.

2.13.1 Life Cycle Theory

The life cycle theory (LCT) describes the advancement in the business of the firm with its growth and maturity (Mueller, 1972). According to this theory, development stages of firms and organizations are similar to that of human life. Life stages include birth, growth, maturity and eventually death (Mueller, 1972). During each stage of development,

institutions life or death is partly dependent on their ability of an appropriate capital generation to proceed its business. The application of LCT can be found in various fields, but its application in the commerce industry is usually recognized by the work of Porter (1980).

Despite the popularity of the LCT, its application in microfinance has remained negligible. There is little, if any, evidence for the transition suggested by the LCT in explaining MFIs development proxied by financial sustainability. LCT is important for MFIs as it analyzes different phases of MFIs life and help us in understanding the variations from normal business expansions (DeSousa-Shields & Frankiewicz, 2004).

Over time, managers of MFIs improve business models, learn through experience, broaden financing options and steer MFIs into financial sustainability (Bayai, 2017). MFIs thus age towards financial sustainability as they develop into large and stable institutions with extended outreach (Schneider & Greathouse, 2004). The development of MFIs into financially sustainable institutions according to Schneider and Greathouse (2004) requires that MFIs integrate into local financial systems. The integration allows MFIs to increase leverage, capitalize on deposit collection and access capital markets in raising funding for growth in a bid to increase outreach. Past LCT–based studies (Felipe, 2011; Schneider & Greathouse, 2004) focused more on the problems of and how MFIs evolved into commercialized institutions and the benefits thereof.

Moreover, DeSousa-Shields and Frankiewicz (2004) have used the application of stages of MFIs life-cycle to understand the capital needs of microfinance institutions better.

Additionally, the life-cycle of MFIs is divided into youth (0 to 4 years), growth (5 to 8 years) and maturity (over eight years) by (Bogan, 2012). During the youth phase, MFIs are usually credit-led, and vision driven institutions with informal processes and struggling to achieve financial self-sufficiency. During the growth stage processes are formalized, and efficiency is increased, savings and payment services are offered, and profitability is achieved in most cases. During the maturity, stage institutions are profitable and seek to enhance its efficiency further, often in an environment of strong competition (DeSousa-Shields & Frankiewicz, 2004).

The latest attempt by Bogan (2012) to make use of the LCT in explaining the financial sustainability of MFIs mainly focused on the transformation of the capital structure during different phases of the life cycle. Additionally, the life cycle of MFIs was divided into different stages including youth, growth, and maturity. Contrary to the above, the life cycle is usually approximated by both age and size of MFIs. The current study is unique to determine how different internal factors such as profitability, portfolio quality, productivity, efficiency, liability management, and gross loan portfolio influence the sustainability, as MFIs grow in age and size.

According to Tucker and Miles (2004), sustainable MFIs have better ROE and ROA. MFIs in the growth stage are on the edge of or have just reached profitability (Flosbach, 2013). An MFI needs 5-6 years to report a positive return on asset (Hartarska, 2005; Zeller & Meyer, 2002). According to Bogan (2008) and Cull and Morduch (2007), the increase in age of MFIs results in increased profitability. Furthermore, MFIs having bigger asset size

have more profitability (Wale, 2009). It implies that profitability affects the sustainability of MFIs depending upon their life cycle.

Several studies have found that PAR>30 days have a significant negative correlation with the sustainability of MFIs (Adhikary & Papachristou, 2014; Ayayi & Sene, 2010; Kar & Swain, 2014b; Tehulu, 2013). Vassilakis (2008) found that MFIs learning increase with an increase in age and size. It implies that with an increase in age and size, MFIs are in a better position to manage their loan portfolios. They are marked by structural changes such as the transformation into regulated and deposit-taking institutions, which allows refinancing at lower expenses (DeSousa-Shields & Frankiewicz, 2004). Flosbach (2013) stated that loan defaults are lowered through better client appraisal, selection and portfolio management. On the contrary, other studies are indicating that as MFIs grow in age and size, their loan default rate increases (see, for example, Kyereboah-Coleman, 2007; Majumdar, 1997). Based on these inconsistent results, this study aims at exploring the moderating effect of proxies of MFIs life cycle on the relationship of PAR>30 days and sustainability.

According to Flosbach (2013), financially unsustainable MFIs strive for sustainability during the youth stage mainly due to external and internal pressures. External pressure includes the lack of willingness by equity and loan providers to invest in unsustainable institutions, as well as the limited financial resources of donors or governmental providers for subsidies. On the contrary, Bogan (2012) posits that soft loans, subsidies, and grants usually provide funds at the inception of MFIs. Furthermore, it is natural for MFIs to be dependent on subsidies in the inception stages (Rhyne, 1998; Schreiner, 2000; Von Pischke, 2007). As MFIs grow in age and size, their dependence on subsidies decreases

(Adongo & Stork, 2005). Therefore, the impact of the grant on sustainability may vary with the life cycle of MFIs.

Internal pressure refers to the desire of staff and management towards job security and professional development that are attached to growth and better financial performance (Flosbach, 2013). It implies that at this life cycle stage of MFIs, staff productivity may be low. Further, Nawaz (2010) stated that staff productivity increases with the life cycle of MFIs. According to Jovanovic (1982), Majumdar (1997) and Coad *et al.* (2010) productivity level of the firms also increases with its maturity. According to Barron *et al.* (1994), matured firms have a high chance of low productivity. Therefore, the impact of staff productivity on sustainability may vary with the life cycle of MFIs.

MFIs having poor control on expenses lead to unsustainability (Bourke, 1989; Pasiouras & Kosmidou, 2007). On the other hand, Haq *et al.* (2010) found that more efficient MFIs would also result in unsustainability due to an increase in non-performing loans. In addition to the above mentioned contradictory results, studies by Bogan (2008), Cull and Morduch (2007) and Oteng-Abayie *et al.* (2013) have found that maturity of MFIs leads to efficiency. Few studies have found an inconsistent relationship between; 1) size of MFIs and efficiency and 2) size of MFIs and sustainability (Kyereboah-Coleman, 2007; Ramasamy *et al.*, 2005; Tripsas & Gavetti, 2000; Wale, 2009). Therefore, this study intends to examine whether the life cycle is the factor that may align these competing arguments.

As mentioned earlier that MFIs at the initial stage of the life cycle are under internal and external pressures to achieve sustainability[5]. Unsustainable institutions lack investors, and debtors trust to attract commercial funds during the initial life cycle stage of MFIs. However, Kyereboah-Coleman (2007) found that mature MFIs are good at managing their liabilities and handling the finance structures. According to Ramasamy *et al.* (2005) size enables the firm to gain leverage and increase productivity. Large enterprises negotiate better with investors and clients as well as have easy access to finance (Yang & Chen, 2009). Therefore, the impact of DER on sustainability may vary with the life cycle of MFIs.

Microfinance institutions which do not manage their loan portfolio disappear from the market (Gutierrez-Nieto *et al.*, 2007). If MFIs want to be sustainable, it should increase its gross loan portfolio (Nwachukwu, 2014; Saeed, 2014). Previous research has captured the differential effect of the gross loan portfolio with the life cycle stage of MFIs. For instance, Coad *et al.* (2010) stated that the gross loan portfolio varies with the age and size of MFIs. MFIs larger in size and experience usually manage its loans more efficiently (Ramasamy *et al.*, 2005; Yang & Chen, 2009). They offer better operational strategies thus resulting in increased loan portfolio (Kipesha, 2013). Despite admitting the differential effect of the life cycle of MFIs on the gross loan portfolio, scant of the studies have approximated their interaction effect on sustainability.

[5] Please see, Flosbach (2013)

2.14 Summary

The chapter gives an overview of the previous literature, review of related studies and empirical finding by the predecessor researchers. The literature highlights that the sustainability of microfinance institutions has been an issue since its inception. Microfinance sustainability may not be determined due to non-availability of standard sustainability measure or index of sustainability. The literature highlights the previous studies in an attempt to determine the sustainability of MFIs and some indices developed for the same purpose.

Furthermore, the literature also reviews the impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio with the sustainability of MFIs. It also reviews the influence of size and age on the sustainability of MFIs. This study also includes the development of a framework by the life-cycle theory of MFIs. The literature of this chapter further helps to construct the hypotheses between profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio with the sustainability of MFIs with the interaction effect of age and size.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter starts with a discussion on the research framework and research hypothesis. Furthermore, the research model is developed to test the hypothesis. In the next section, operational definitions and measurements for the variables used in the framework are discussed. Furthermore, data samples and collection sources, diagnostic tests, and data analysis techniques are also explained.

3.2 Sustainability Index

Financial sustainability was one of the key measurement variables for the sustainability of microfinance institutions (Ayayi & Sene, 2010; Basharat *et al.*, 2015; Rahman & Luo, 2012; Sekabira, 2013; Tehulu, 2013). Financial sustainability is calculated by using FSS and OSS (Ayayi & Sene, 2010; De Crombrugghe *et al.*, 2008; Kazemian *et al.*, 2014; Lenssen *et al.*, 2014; Tehulu, 2013). Several studies have mentioned that for MFIs to be sustainable, they should be financially self-sufficient (Gibbons & Meehan, 1999; Kar, 2013; Kinde, 2012; Morduch, 1999). FSS index is the most used tool to determine MFIs sustainability (Christen, 1995; Manos & Yaron, 2008).

In addition to financial self-sufficiency index, financial sustainability is also determined by OSS, which measures MFIs ability to cover the cost of operations by using its profits (CGAP, 2003; Okumu, 2007). Several studies have used OSS as a measurement tool for

MFIs sustainability (Annim, 2012; Bogan, 2012; Bogan *et al.*, 2007; Ngo *et al.*, 2014; Rai & Rai, 2012).

According to the triangle of microfinance theory presented by Zeller and Meyer (2002), the performance of microfinance institutions is not dependent only on financial sustainability but also by outreach and impact of outreach. Similarly under Welfarist Approach, for an institution to be sustainable, the core function of MFIs were to reach the maximum poor clients (Hulme & Mosley, 1996; Kipesha & Zhang, 2013; Morduch, 2000; Woller *et al.*, 1999). Several studies have used outreach as the measurement tool of sustainability regarding depth and breadth of outreach (Ambe Shu & Oney, 2014; Okumu, 2007; Rhyne, 1998; Yaron, 1994). Total NAB and ALPB are the measurements used for breadth and depth of outreach (Bhanot *et al.*, 2015; Dey, 2015; Gashayie, 2014; Kumar Kar, 2011; Mersland & Strøm, 2010; Nanayakkara, 2012; Paxton, 2002; Zerai & Rani, 2012). Several studies have focused on the effect of depth and breadth of outreach on the sustainability of MFIs (Abate *et al.*, 2014; Adhikary & Papachristou, 2014; Hishigsuren, 2007; Kinde, 2012; Nurmakhanova *et al.*, 2015; Zerai & Rani, 2012).

Financial sustainability and outreach have not been considered jointly to measure the sustainability of MFIs except a study by Bhanot *et al.* (2015). Bhanot *et al.* (2015) have developed a sustainability index for microfinance institutions in India. They measured

financial sustainability by using operational self-sufficiency (which is only one dimension of financial sustainability)[6] and outreach by using depth and breadth of outreach.

Since microfinance institutions are developed to provide the funds by reaching the poorest clients and by reaching a maximum number of the clients. Simultaneously, MFIs financial sustainability needs to be focused in the long run because if MFIs are unable to continue their operations, in the long term, the whole system for MFIs will collapse. Therefore, this study focuses on measuring MFIs sustainability by using both financial sustainability and outreach. Financial sustainability is measured by using FSS and OSS, and outreach is measured by using depth and breadth of outreach. The measurement for breadth and depth of outreach as employed in various studies are NAB and ALPB.

3.3 Development of Sustainability Index

Sustainability index for MFIs in Pakistan is developed using principal component analysis and is measured by using FSS, OSS, depth, and breadth of outreach. Principal components determined by factor analysis is a technique to examine the similarities in a data series (Asteriou & Price, 2001). Furthermore, it provides a means for identification of unobserved common factors (sustainability in this case)[7]. In this technique, a combination of the linearly independent variables explains the observed variable. Following Asteriou and Price (2001), the objective of the study is to develop a mix of technical variables out of the

[6] Financial sustainability as mentioned earlier is measured by using both financial self-sufficiency and operational self-sufficiency. For details see CGAP report 2004.

[7] For a more detailed exposition of the Principal Components Method see Koutsoyiannis (1977) and Theil (1971).

initially available variables. The loadings for the variables are chosen to satisfy the following conditions of constructed principal components:

1) the primary components are not correlated,
2) the first principal component captivates the maximum proportion out of the total variation for the group of available variables, the second component absorbs the maximum proportion out of the remaining variation in the group (after considering the variation captivated by the first principal component), and so on.

To overcome the shortcomings of the index developed by Bhanot *et al.* (2015), this study develops a sustainability index using the following equation.

$$S.I_{it} = w_1 FSS_{it} + w_2 OSS_{it} + w_3 DOO_{it} + w_4 BOO_{it} \quad (3.1)$$

Where;

S.I = sustainability index for microfinance institutions,

w_1, w_2, w_3, w_4 = the weight assigned by Principal Component Analysis

FSS = financial self-sufficiency ratio,

OSS = operational self-sufficiency ratio,

DOO = depth of outreach and

BOO = breadth of outreach.

Since outreach depth is approximated by ALPB, whereas, outreach breadth is approximated by NAB, the above equation takes the following form;

$$S.I_{it} = w_1 FSS_{it} + w_2 OSS_{it} + w_3 ALPB_{it} + w_4 NAB_{it} \quad (3.2)$$

Where,

ALPB = average loan balance per borrower

NAB = number of active borrowers

3.4 Research Framework

Research framework (refer to figure 3.1) for this study is developed based on life cycle theory, already discussed in Chapter 2 (refer to section 2.13). The dependent variable as shown in this framework is sustainability which is measured by developing an index using financial self-sufficiency (FSS), operational self-sufficiency (OSS), average loan balance per borrower (ALPB) and a number of active borrowers (NAB). Independent variables in this study include profitability, portfolio quality, productivity, efficiency, liability management, and gross loan portfolio. Profitability in this study is measured using ratios of return on assets (ROA) and return on equity (ROE). Portfolio quality is determined using the ratio of the portfolio at risk > 30 days (loan amount overdue greater than 30 days).

To assess the productivity of MFIs, borrower per staff members (BPSM) is used. The efficiency of MFIs is approximated using the operating expense ratio (OER). Liability management of MFIs is determined using the debt to equity ratio (DER) and gross loan

portfolio (GLP). The moderation of age of MFIs and size of MFIs with regressors are used as proxies of life cycle theory of the MFIs. The proposed research framework is:

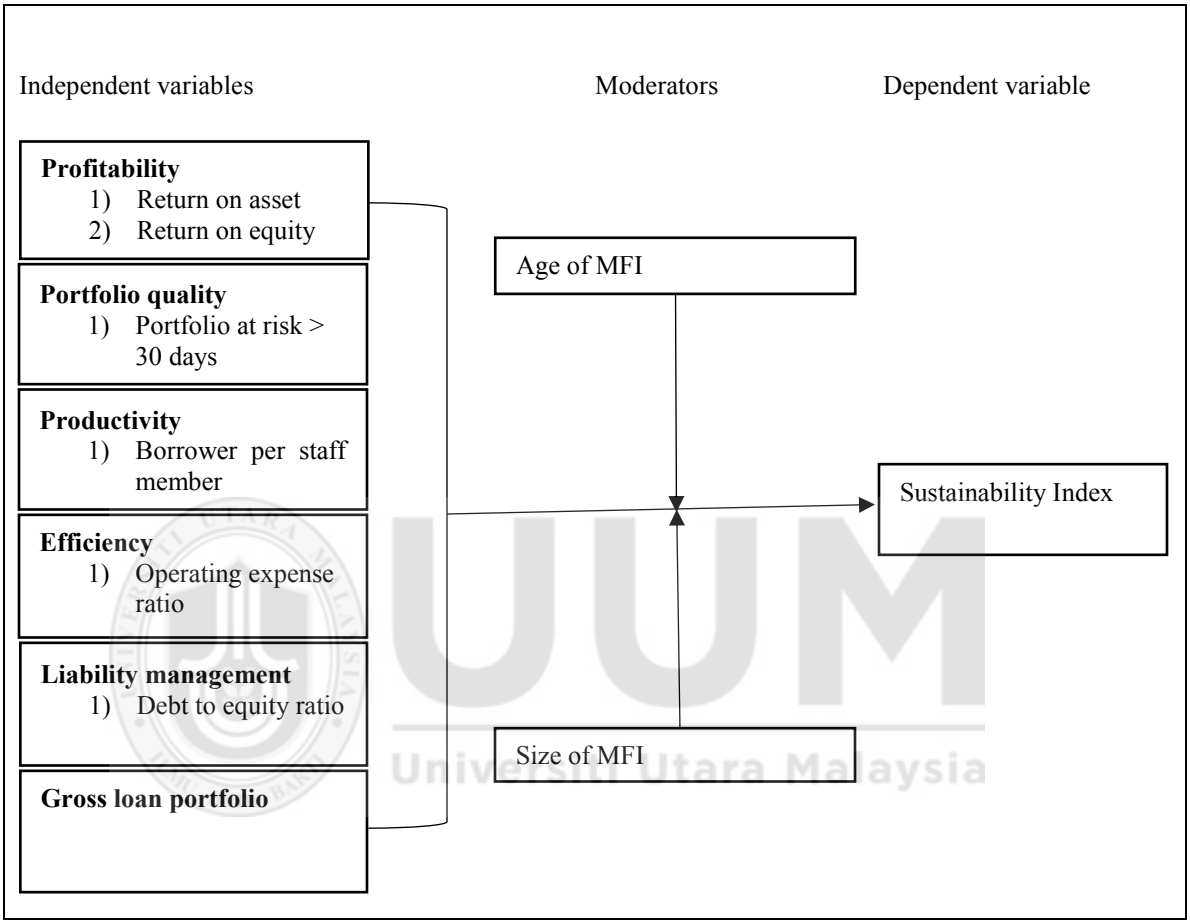

Figure 3.1
Research Framework

3.5 Hypothesis Development

The research hypothesis for the current study is developed in the next sections.

3.5.1 Independent Variables and Dependent Variables

Profitability is the key determinant of sustainability. According to CGAP (2003), return on asset (ROA) and return on equity (ROE) are used to quantify the profitability of MFIs.

Stauffenberg *et al.* (2003) emphasized that ROA reflects the marginal profit in MFIs. Positive ROA helps organizations to attract funds from commercial investors and become a regulated commercial institution (Adhikary & Papachristou, 2014). According to Hartarska (2005) and Zeller and Meyer (2002), MFIs normally take 5-6 operational years to have positive ROA, which is based on the service delivery system and technology they use. Moreover, ROE is critical for investors as it calculates the profit on the investments (Rahman & Mazlan, 2014c). It may be argued that MFIs are not profit-making business, so ROE does not matter. Since MFIs are advancing towards banks and banking institutions, these structures allow MFIs to enter into the capital market to generate funds for operations (Armendáriz de Aghion & Morduch, 2000) Therefore, Campbell and Rogers (2012) reported that ROE is important as it replace grants with investors fund, helping MFIs to be self-sufficient.

MFIs provide funds for the poor people who are unable to provide collateral. These loans are considered as high risk, and it is tough to manage these portfolios. It is critical to analyze the quality of the loan portfolio as it is the biggest risk for any MFI (Stauffenberg *et al.*, 2003). Portfolio at risk greater than 30 days (PAR>30) is used to measure the quality of loan portfolio (Adhikary & Papachristou, 2014; Stauffenberg *et al.*, 2003), and indicates the proportion of outstanding loans that were not recovered for more than 30 days. Nanayakkara (2012) argued that if institutions are unable to recover the amount of loan within due date than the loan portfolio is at risk.

According to Adhikary and Papachristou (2014), and Hudon and Traca (2011) borrower per staff member (BPSM) is the proximate measure to determine the productivity of

microfinance institutions. It measures the number of loans managed by each staff member. Nyamsogoro (2010) has found BPSM as possible explanatory factors for the sustainability of MFIs.

The efficiency of MFIs is measured using the operating expense ratio. Good cost management is a necessary ingredient for sustainability. Well-managed MFIs should produce loans at a lower cost and keep other operating costs to the barest minimum. According to CGAP (2003), the cost of transactions is a mix of managerial and operating cost; however, exclude provision for loan loss and financial expenses. Islam *et al.* (2014) concluded that operational cost significantly affects MFIs financial sustainability.

The debt to equity ratio (DER) determines capital adequacy as it measures institutions overall leverage (Stauffenberg *et al.*, 2003). DER is critical for credit providers because it describes the loss absorption capacity of the institution. MFIs usually does not have a high DER because they are unable to attract commercial lending. However, when MFIs transform into formal institutions or banks their DER rises (Stauffenberg *et al.*, 2003). DER varies across MFIs depending on their ability to carry a risk for a given equity. Normally, MFIs maintain low DER because their portfolio of loans has no backup collateral when compared with commercial institutions. Wijesiri *et al.* (2017) found that DER negatively affects the social efficiency of MFIs. However, Kinde (2012) suggest an insignificant relationship between DER and sustainability. Furthermore, GLP is included to capture loan portfolio size of MFIs. Previous studies suggest that GLP is significantly related to the sustainability of MFIs (Ngo *et al.*, 2014; Nwachukwu, 2014).

Thus, the current study comes up with the following hypothesis.

Hypothesis 1: ROA (profitability) and sustainability are related significantly.

Hypothesis 2: ROE (profitability) and sustainability are linked significantly.

Hypothesis 3: Portfolio quality measured by PAR>30 days and sustainability are linked significantly.

Hypothesis 4: Productivity measured by BPSM and sustainability are related significantly.

Hypothesis 5: OER (efficiency) and sustainability are related significantly.

Hypothesis 6: Liability management approximated by DER and sustainability are linked significantly.

Hypothesis 7: GLP and sustainability are linked significantly.

3.5.2 Moderating effect of Age of Microfinance Institutions

In the beginning years of its operations, the age of microfinance institutions directly refers to the efficiency and growth (Cull & Morduch, 2007; Gonzalez, 2007a). According to Robinson (2001), financial self-sufficiency rate for MFIs having age more than six years was almost 102 percent. On the other hand, MFIs with age ranges between 3 to 6 years have financial self-sufficiency ratio of 86 percent. Similarly, the ratio tends to decline up to 69 percent for MFIs, who were having age below three years. Robinson (2001) also found that MFIs age significantly influences the sustainability of MFIs. The result was supported in the later years by Bogan *et al.* (2007) and Cull and Morduch (2007). Contrary

to Bogan *et al.* (2007), Cull and Morduch (2007) and also Robinson (2001), a study by Kyereboah-Coleman and Osei (2008) found the insignificant relationship of sustainability with the age of MFI. Their relationship has been discussed in detail in section 2.12.1. Following hypothesis are developed by reviewing previous literature.

Hypothesis 8: Age of MFIs has a moderating effect on the relationship between profitability (ROA) and sustainability.

Hypothesis 9: Age of MFIs has a moderating effect on the relationship between profitability (ROE) and sustainability.

Hypothesis 10: Age of MFIs moderates the relationship between portfolio quality (PAR>30 days) and sustainability.

Hypothesis 11: Age of MFIs moderates the relationship between productivity (BPSM) and sustainability.

Hypothesis 12: Age of MFIs moderates the relationship between efficiency (OER) and sustainability.

Hypothesis 13: Age of MFIs moderates the relationship between liability management (DER) and sustainability.

Hypothesis 14: Age of MFIs moderates the relationship between GLP and sustainability.

3.5.3 Moderating effect of Size of Microfinance Institutions

The empirical study estimates the evidence of a significant positive correlation between MFIs size and its sustainability. Nyamsogoro (2010), Bogan (2008) along with Mersland and Strøm (2008) and Cull and Morduch (2007) also found that MFIs size has a significantly positive relationship with sustainability. These studies have found that several cost benefits are associated with the increase in MFIs size. Thus, current study develops the following hypothesis.

Hypothesis 15: Size of MFIs has a moderating effect on the relationship between profitability (ROA) and sustainability.

Hypothesis 16: Size of MFIs has a moderating effect on the relationship between profitability (ROE) and sustainability.

Hypothesis 17: Size of MFIs moderates the relationship between portfolio quality (PAR>30 days) and sustainability.

Hypothesis 18: Size of MFIs moderates the relationship between productivity (BPSM) and sustainability.

Hypothesis 19: Size of MFIs moderates the relationship between efficiency (OER) and sustainability.

Hypothesis 20: Size of MFIs moderates the relationship between liability management (DER) and sustainability.

Hypothesis 21: Size of MFIs moderates the relationship between GLP and sustainability.

3.6 Variable Definitions and Measurements

To understand the above model, the definitions and measurement of the variables used in this study are discussed below.

3.6.1 Dependent Variable

Sustainability index is the dependent variable for this study. This index determines the sustainability level of microfinance institutions during the year.

3.6.1.1 Sustainability Index

As per Bebbington *et al.* (2007), it is vital for institutions and individual societies to develop tools, metrics, and models to identify the reasons and the level of magnitude to which their operations are unsustainable. Furthermore, Ness *et al.* (2007) found the reason for the assessment of sustainability is to help the organizational policy makers to evaluate their systems in the short and long term. This would assist them in identifying the necessary actions/measures required or not required to make the organizations sustainable. Thus, in any organizational management system, monitoring of sustainability has an important role in helping policymakers in evaluation (Salvado *et al.*, 2015).

Sustainability can be best defined as the MFIs ability to cover the cost of its operation by being financially sustainable and reaching the maximum poor clients to alleviate poverty (Armendáriz de Aghion & Morduch, 2000; Navajas, 2000). In this study, the sustainability index is developed by using FSS, OSS, NAB, and ALPB.

The measurement for FSS is obtained from Financial Self-Sufficiency Index (FSS) (Christen, 1995). The formula used for the measurement is;

$$FSS = \frac{\text{ADJUSTED OPERATING REVENUE}}{\text{ADJUSTED (FINANCIAL EXPENSE + NET LOAN LOSS PROVISION + OPERATING EXPENSE)}} \quad (3.6)$$

According to Christen (1995), three types of adjustments are made to revenues and costs when FSS is computed. These adjustments include inflation effect, subsidies and write-offs, and loan loss provisions. Since inflation affects the monetary value of net assets, therefore, adjustments over the period are required (CGAP, 2003). For subsidies, three types of adjustments are computed: borrowings at interest rates below the market rates, in-kind grants and donations received in cash. Thirdly, write-offs and loan loss provision adjustments account for the effect of delinquencies on MFI. Several studies have used the above measurement for financial self-sufficiency to determine the sustainability (Boehe & Cruz, 2013; Cull & Morduch, 2007; Gashayie, 2014); Kar (2013); (Kinde, 2012; Rahman & Mazlan, 2014c).

OSS measures MFIs ability to cover expenses from its operating revenues. This expenditure covers all cost of operations such as expense from operations, expenditure from the provision for loan losses and expenses incurred on financial activities (CGAP, 2003). It is measured by using the following equation

$$OSS = \frac{\text{OPERATING REVENUE}}{\text{(FINANCIAL EXPENSE + NET LOAN LOSS PROVISION + OPERATING EXPENSE)}} \quad (3.7)$$

Several studies have also measured the sustainability of MFIs by using operational self-sufficiency (see for example Islam *et al.*, 2014; Lenssen *et al.*, 2014; Ngo *et al.*, 2014; Nurmakhanova *et al.*, 2015; Qayyum & Ahmad, 2006; Quayes, 2015; Zerai & Rani, 2012).

Yaron (1994) and Okumu (2007) describe outreach as MFIs efforts to provide service to poor people of the society formally unserved by other financial institutions. Zeller and Meyer (2002), approximated outreach as breadth and depth, where outreach breadth represents the total number of poor served by MFIs and outreach depth represents the socioeconomic impact which MFIs services have to the target clients (Rao, 2014; Rauf & Mahmood, 2009). ALPB is the proxy used to measure the depth for MFIs outreach (Daher & Le Saout, 2015; Janda & Turbat, 2013; Kar, 2013; Kaur, 2014; Louis & Baesens, 2013; Nwachukwu, 2014). Here;

$$\text{ALPB}=\frac{\text{GROSS LOAN PORTFOLIO}}{\text{NUMBER OF ACTIVE BORROWERS}} \quad (3.8)$$

The breadth of outreach is measured using number of active borrowers (Crawford *et al.*, 2014; Nanayakkara, 2012; Rahman & Mazlan, 2014b; Sarma & Borbora, 2011; Vanroose & D'Espallier, 2013). Qayyum and Ahmad (2006) use a scale parameter of 10,000 active borrowers and above as an indication of MFIs sustainability in South Asian countries.

3.6.2 Independent Variables

Profitability, portfolio quality, productivity, efficiency, liability management, and gross loan portfolio are the influencing variables under discussion.

3.6.2.1 Profitability

Profitability of MFIs is measured by using ROA and ROE (CGAP, 2003; Mersland & Strøm, 2009). According to Von Stauffenberg *et al.* (2003), ROA and ROE are the measurements for approximating profitability of any institution. ROA is a ratio used to measure the profitability of microfinance institutions (Rahman & Mazlan, 2014c; Zaigham & Asghar, 2011).

Where,

$$\text{ROA} = \frac{\text{(NET OPERATING INCOME - TAXES)}}{\text{AVERAGE ASSETS}} \qquad (3.9)$$

The greater value of ROA shows that MFIs are efficiently utilizing its assets for generating revenues. ROA depicts the return MFIs get from its operations, investments, GLP and assets utilization. Several studies have used ROA as a proximate measure to determine MFIs profitability (Ambe Shu & Oney, 2014; Bhanot *et al.*, 2015; Daher & Le Saout, 2015; Islam *et al.*, 2014; Qayyum & Ahmad, 2006; Zaigham & Asghar, 2011).

ROE measures the efficient utilization of MFIs equity for generating revenues (CGAP, 2003; Rahman & Mazlan, 2014c).

$$\text{ROE} = \frac{\text{(NET OPERATING INCOME - TAXES)}}{\text{AVERAGE EQUITY}} \qquad (3.10)$$

ROE refers to MFIs ability to give benefit to its investors, increase its base equity and attract more investors. Other MFIs which are not profit-oriented focus on ROE to increase

equity via retained earnings and by increasing their portfolio. In equation 3.10, average equity does not include donations and grants received from the external source (CGAP, 2003). ROE has been used as a proxy for the measurement of profitability in several studies (see for example Ambe Shu & Oney, 2014; Chaves & Gonzalez-Vega, 1996; D'Espallier *et al.*, 2013; Rahman & Mazlan, 2014c).

3.6.2.2 Portfolio Quality

PAR is a tool to determine the quality of MFIs portfolio (Adhikary & Papachristou, 2014). According to CGAP (2003), PAR>30 days can be understood as the principal loan amounts which are outstanding for more than 30 days. The sum amount includes all outstanding balances which are still due and exclude the accrued interest. These loans are also exclusive of restructured amounts of loan. PAR>30 days is calculated by using the following equation.

$$\text{PAR>30 DAYS} = \frac{\text{(UNPAID PRINCIPAL BALANCE OF PAST DUE LOANS WITH OVERDUE>30 DAYS)}}{\text{GROSS OUTSTANDING LOAN PORTFOLIO}} \quad (3.11)$$

The good quality portfolio usually has the lowest value for PAR>30 days (Tehulu, 2013). Several studies in the literature have used PAR>30 days to measure the portfolio quality (Conning, 1999; Janda & Zetek, 2014; Kaur, 2014; Rai & Rai, 2012; Sheremenko *et al.*, 2012; Tehulu, 2013).

3.6.2.3 Productivity

To determine the productivity of MFIs, borrower per staff member is calculated (Cull & Morduch, 2007; Hudon & Traca, 2011; Quayes, 2012). The borrower per staff member (BPSM) ratio measures the capability of MFIs staff in managing its client (Market, 2010). In MFIs, each staff has a certain number of loan cases to deal with. Therefore, productivity can best be measured by this ratio.

$$\text{BPSM}=\frac{\text{TOTAL NUMBER OF ACTIVE BORROWERS}}{\text{NUMBER OF TOTAL STAFF}} \quad (3.12)$$

Several studies in the previous literature have used borrower per staff member to measure the productivity of MFIs (Ayayi & Sene, 2010; Kumar Kar, 2011; Nawaz, 2010; Nwachukwu, 2014; Rahman & Mazlan, 2014b).

3.6.2.4 Efficiency

OER is the measurement variable for MFIs efficiency. It is measured by using the following equation.

$$\text{OER}=\frac{\text{TOTAL OPERATING EXPENSE}}{\text{AVERAGE OUTSTANDING PORTFOLIO}} \quad (3.13)$$

According to Rai and Rai (2012), for an MFI to be efficient, the standard value for operating expense ratio must be less than 20%. OER depicts the ability of MFIs to manage its expenses as per its loan portfolio and has been widely used in studies (Ambe Shu & Oney, 2014; Cull, 2011; Louis & Baesens, 2013; Rai & Rai, 2012; Tucker & Miles, 2004).

3.6.2.5 Liability Management

Debt to equity is a measure of liability management and is used to measure what amount of debt and equity is used to finance assets (Muwamba, 2012). Tucker and Miles (2004) in their study used following measurement of DER to determine the financial performance of MFIs.

$$\text{DER}=\frac{\text{TOTAL LIABILITIES}}{\text{TOTAL EQUITY}} \quad (3.14)$$

Total liabilities in the numerator consists of all the payables by MFIs including accounts liability, borrowings, deposits, and payable accounts. Total equity in the denominator includes all of its assets excluding its liabilities. The measurement for DER have already been used in the literature (Abate *et al.*, 2014; Hermes *et al.*, 2011; Ngo *et al.*, 2014; Olasupo *et al.*, 2014; Qayyum & Ahmad, 2006; Quayes, 2015; Rai & Rai, 2012)

3.6.2.6 Gross Loan Portfolio

According to Bhanot *et al.* (2015), gross loan portfolio (GLP) represents the amount of money MFI has disbursed in its loans. According to CGAP (2003), GLP is the amount of principal loan amount (restructured, delinquent and current) outstanding against customer except the loan written off by MFI. The interest which is receivable by the MFIs is also not a part of GLP. Other studies have also used the gross loan portfolio as a measure of total loan amount disbursed by MFI (Bogan, 2012; Cull & Morduch, 2007; Ngo *et al.*, 2014). Increase in GLP may be either due to an increase in a number of borrowing customers

keeping the same loan size or increase in the size of the loan by keeping the same borrowers (Quayes, 2012).

3.6.3 Moderating Variable

Age and size of MFIs are the moderating variables used in this study. Their operational definitions are discussed below.

3.6.3.1 Age of Microfinance Institutions

According to Kipesha (2013), Adhikary and Papachristou (2014) and Cull and Morduch (2007) age refer to the total number of years MFIs have been in operation.

Age = Number of years MFIs have been in operation (3.16)

3.6.3.2 Size of Microfinance Institutions

According to Tehulu (2013) and Adhikary and Papachristou (2014), size of MFI is measured by its total assets.

Size = Total assets (3.17)

3.7 Research Model

The principal component analysis is used to develop the sustainability index for MFIs in Pakistan. Multiple regression analysis is used to test the impact of independent variables including profitability, portfolio quality, productivity, efficiency, liability management and

gross loan portfolio on sustainability. Also, interaction of age and size of MFIs with explanatory variables is used to determine the sustainability.

3.7.1 Multiple Regression Model

Multiple regression is used in finding the linear combination of all the predictors which provide the best approximation of the dependent variable (Mason & Perreault Jr, 1991). The model validity can be determined by R^2 (coefficient of determination) which indicates the variance of the dependent variable that was accounted for by the independent variables (Inder, 1986). The magnitude of R^2 determines the predictive accuracy and statistical significance of the model (Mason & Perreault Jr, 1991).

Multiple regression analysis is used in this study to test the impact of independent variables including profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs. The empirical model for the current study can be specified as;

$$S.I_{it} = \alpha_0 + \beta_1 ROA_{it} + \beta_2 ROE_{it} + \beta_3 PAR_{it} + \beta_4 BPSM_{it} + \beta_5 OER_{it} + \beta_6 DER_{it} + \beta_7 GLP_{it} + \varepsilon_{it} \quad (3.3)$$

Where;

S.I = sustainability index,

i = microfinance institution,

t = time period,

ROA = return on assets,

ROE = return on equity,

PAR = portfolio at risk > 30 days,

BPSM = borrowers per staff member,

OER = operating expense ratio,

DER = debt to equity ratio,

GLP = gross loan portfolio, and

ε = error term.

3.7.2 Moderated Multiple Regression Model

The moderated multiple regression models is an advancement of the simple regression model used in a study (Hair, 2006). The moderated regression model test the hypothesis of the explanatory variable with the dependent variable by using the interaction term (moderating variable) (Baron & Kenny, 1986). Moderated Multiple Regression model is the best suitable method for examining the interaction effects of variables (Aguinis, 1995; Hartmann & Moers, 2003; Villa *et al.*, 2003). This method adds a third variable to the simple regression model and hence improves the estimates of regression. Sharma *et al.* (1981) and Barron *et al.* (1994) describes that the interaction term affects the strength and direction of the relationship between explanatory variables and a dependent variable.

Sharma *et al.* (1981) contend that in some cases the predictive efficacy or relationship between an explanatory variable and dependent variable may vary as a function of some other variables.

To test the moderating effects, a model by Baron and Kenny (1986) is used. The model is previously used by many researchers, such as (Aguinis, 1995; Hartmann & Moers, 2003; Sharma *et al.*, 1981; Villa *et al.*, 2003). According to Baron and Kenny (1986), the model diagrammed (refer to Figure 3.2) shows three different paths. The path a, b and c in figure 3.2 describes the impact of the predictor, moderator, and interaction of predictor and moderator on outcome variables. In this study, the influence of age and size, as a proxy for LCT, of MFIs as a moderator are examined to identify its effects on the impact of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio (independent variable) on sustainability (dependent variable).

According to Baron and Kenny (1986), the path diagram can clearly explain the relation of independent variable and moderator with the dependent variable. The moderating effect model presented by Baron and Kenny (1986) can be best understood by using figure 3.2.

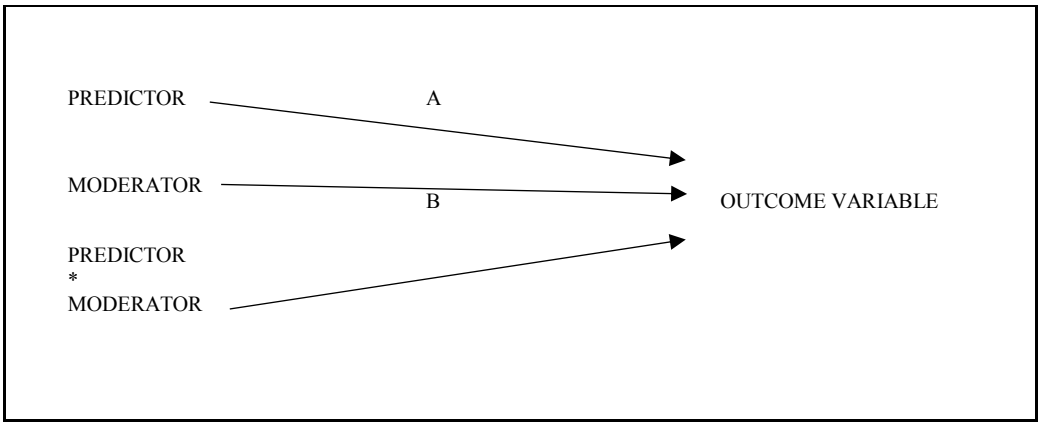

Figure 3.2
Moderator model by Baron and Kenny (1986)

The equatorial model by using the age of MFIs as a moderator is given below.

$$S.I_{it} = \alpha_0 + \beta_1 ROA_{it} + \beta_2 ROE_{it} + \beta_3 PAR_{it} + \beta_4 BPSM_{it} + \beta_5 OER_{it} + \beta_6 DER_{it} + \beta_7 GLP_{it} + \beta_9 ROA_{it} \times AGE + \beta_{10} ROE_{it} \times AGE + \beta_{11} PAR_{it} \times AGE + \beta_{12} BPSM_{it} \times AGE + \beta_{13} OER_{it} \times AGE + \beta_{14} DER_{it} \times AGE + \beta_{15} GLP_{it} \times AGE + \mu_{it} \quad (3.4)$$

Where, AGE is the age of MFIs and ROA * AGE, ROE * AGE, PAR>30 * AGE, BPSM * AGE, OER * AGE, DER * AGE, and GLP * AGE are the interaction terms.

The equatorial model by using the size of MFIs as a moderator is given below.

$$S.I_{it} = \alpha_0 + \beta_1 ROA_{it} + \beta_2 ROE_{it} + \beta_3 PAR_{it} + \beta_4 BPSM_{it} + \beta_5 OER_{it} + \beta_6 DER_{it} + \beta_7 GLP_{it} + \beta_9 ROA_{it} \times SIZE + \beta_{10} ROE_{it} \times SIZE + \beta_{11} PAR_{it} \times SIZE + \beta_{12} BPSM_{it} \times SIZE + \beta_{13} OER_{it} \times SIZE + \beta_{14} DER_{it} \times SIZE + \beta_{15} GLP_{it} \times SIZE + \mu_{it} \quad (3.5)$$

Where, SIZE is the size of MFIs and ROA * SIZE, ROE * SIZE, PAR>30 * SIZE, BPSM * SIZE, OER * SIZE, DER * SIZE, and GLP * SIZE are the Interaction terms.

3.7.3 Hausman Tests

As this study is using panel data, an analysis to choose the most appropriate panel data model for the study is conducted. Following Greene (1990) and Gujarati (2003), there are two most prominent panel data model; fixed effects model and random effects model. Then, the Hausman test is conducted to choose the most appropriate model for the study. The null hypothesis underlying the Hausman test is that the fixed effects model and random effects model estimators do not differ substantially. Thus, if the null hypothesis is rejected, the conclusion is that the random effects model is not appropriate, and the fixed effects model should be used.

3.8 Data Collection

According to Pakistan microfinance review 2015, microfinance providers in Pakistan are categorized into three groups; microfinance banks, microfinance institutions, and rural support programs. Table 3.1 provides the definitions for each of these categories.

Currently, there are 50 microfinance providers in Pakistan which are all members of Pakistan microfinance network (PMN). Out of these 50 members, only 27 microfinance providers reported on the MIX market database, including 5 Microfinance banks, 19 microfinance institutions and three rural support program (Pakistan Microfinance Network, 2014). On the contrary, 44 microfinance providers reported their data to PMN in the year 2015.

Table 3.1
Microfinance providers and their definitions

Microfinance providers	Definition
Microfinance Institution	"A non-bank non-government organization (NGO) providing microfinance services. Organizations in this group are registered under a variety of regulations, including the Societies Act, Trust Act, and the Companies Ordinance. The MFI peer group includes local as well as multinational NGOs such as BRAC-Pakistan and ASA-Pakistan. As of now these organizations are in process of transformation into Non-Bank MFIs under the new regulatory framework laid out for non-bank players by SECP".
Microfinance Bank	"A commercial bank licensed and prudentially regulated by the SBP to exclusively service the microfinance market. The first MFB was established in 2000 under a presidential decree. Since then, 11 MFBs have been licensed under the Microfinance Institutions Ordinance, 2001. MFBs are legally empowered to accept and intermediate deposits from the public".
Rural Support Program	"An NGO registered as a non-profit company under the Companies Ordinance. An RSP is differentiated from the MFI peer group based on the purely rural focus of its credit operations. As of now these organizations are in process of transformation into Non-Bank MFI under the new regulatory framework laid out for non-bank players by SECP".

Source: Pakistan Microfinance Network (2015)

In regards to GLP, microfinance banks account for 60 percent of the total GLP, followed by MFIs with a share of 21 percent and rural support programs with a share of 19 percent. Moreover, microfinance banks accounted for 69 percent of the asset base of the industry followed by MFIs at 16 percent and rural support programs by 15 percent.

Table 3.2
Microfinance providers in Pakistan

Microfinance providers	Total PMN member	MIX market database
Microfinance banks	9	5
Microfinance institutions	35	19
Rural support programs	6	3
Total	50	27

Source: Pakistan Microfinance review 2014

All reporting organizations offer microcredit services, including both for income generating purposes and non-income generating purposes. Loans for micro-enterprises are by far the most common, with all reporting microfinance providers offering these, followed

by agricultural/livestock microcredit. Other activities for which a growing number of microfinance providers offer credit products include SME loans and express loans.

In this study, data is collected for all microfinance providers in Pakistan, which have been in operations on or before 2006. Data is gathered using annual reports obtained from MFIs in Pakistan, a library of State Bank of Pakistan, Pakistan Microfinance Network and MIX market website (www.mixmarket.org) for the year 2006 to 2015. Panel data is employed in this study for analysis as it minimizes the collinearity problem, thus provide more data points and simplify the use of econometric models.

There are several reasons why Pakistan makes a good case for this study. First, the Consultative Group to Assist the Poor (CGAP), a policy and research center housed at the World Bank, calls Pakistan's microfinance sector a "laboratory for innovation." The question is whether these laboratories are focusing on the actual mission of microfinance by achieving a double bottom line? The present study provides an answer to this question by determining the sustainability level of MFIs in Pakistan under the approach of the double bottom line.

Pakistan is a newcomer in microfinance, relative to Bangladesh and India; it is often referred to as a regional leader for having established the new-age version of microfinance institutions. The 2012 Global Microscope Report, a sector review published annually by the Economist Intelligence Unit (EIU) calls Pakistan "one of the few countries in the world that has a separate legal and regulatory framework for microfinance institutions and is

generally considered to have one of the most enabling environments for microfinance regionally and globally" (E.I.U, 2012).

Pakistan has three dominant institutional models of microfinance – microfinance institutions, the much more commercially oriented microfinance banks, and the provincial government monitored rural support programs. Since the study is focused on evaluating the sustainability of these institutions, considering different institutional models with same focus would help to understand better the factors that influence their sustainability. Additionally, MFIs in Pakistan have shown tremendous growth over the last few years. These MFIs may provide a better insight on understanding of the literature whether growth in terms of age and size influence their sustainability.

The Pakistan Microfinance Network (PMN) is a hub agency established by a network of local microfinance institutions, under the supervision of State Bank of Pakistan, incorporated under the Companies Ordinance. PMN publishes the annual data for the microfinance sector in Pakistan. MFIs started reporting structured data to PMN from 2006, and, after that, they continue to publish consolidated annual reports for the microfinance sector.

The PMN data is listed on the Microfinance Information Exchange (MIX), an online database of registered microfinance institutions across the globe. MIX is operated by the Consultative Group to Assist the Poor (CGAP), an independent policy and research center housed at the World Bank in Washington DC. MIX data has been used extensively in studies on microfinance.

Also, several academic publications originating from Pakistan have used PMN's data (see, for example, Basharat *et al.*, 2014; Rauf & Mahmood, 2009). International donor reports also use PMN data, for instance, the International Finance Corporation's 2008 publication and the UK Department for International Development's 2006 publication relied extensively on the PMN database. As the primary databank of the microfinance sector in Pakistan, the PMN receives assistance from these institutions for capacity building and institutional strengthening. Thus, PMN provides the most reliable and extensive data on microfinance in Pakistan.

3.8.1 Sample of the Study

The sample of this study comprises of 38 microfinance institutions (MFIs) working in Pakistan, categorized under microfinance banks, microfinance institutions and rural support programs. Data for the study is obtained for the year 2006-2015 from Pakistan Microfinance Network (PMN), Microfinance Information Exchange Market (MIX) and annual reports of microfinance organizations. The total number of observations for the study are 273 as some MFIs were not consistent in reporting their data for the analysis period. This constitutes an unbalanced panel data.

Table 3.3
Microfinance providers in Pakistan

Types of Microfinance Providers	Name of institutions	Number of years' data reported
Microfinance Banks	Khushali bank limited	10
	Tameer microfinance bank limited	10
	Pak Oman microfinance bank limited	10
	The First microfinance bank limited	10
	National rural support program bank	05
	Finca microfinance bank limited (formerly KASHF microfinance bank)	08
	Apna microfinance bank limited (formerly NMFB)	10
	Waseela microfinance bank limited	04
	U microfinance bank limited (formerly Rozgar microfinance bank)	08
Microfinance institutions	Orange charitable trust	10
	Kashf Foundation	10
	Safco support fund	10
	Development action for mobilization and emancipation	10
	Community support concern	10
	Ghazi barodha taraqiati idara	04
	Farmer friends organization	06
	ASA Pakistan limited	07
	BRAC Pakistan	08
	Jinnah welfare society	07
	Sungei development foundation	07
	Orix Leasing Pakistan limited	10
	Rural community development society	10
	Agahe	03
	Al Mehran rural development organization	03
	Mojaz foundation	03
	Naymet trust	03
	Organization for participatory development	03
	Saath development society	03
	Shadab rural development organization	03
	Soon valley development project	03
	Villagers development organization	03
	Asasah	07
	Akhuwat	10
Rural Support Programs	National rural support program	10
	Punjab rural support program	10
	Sarhad rural support program	09
	Thardeep rural development program	10
	Sindh rural support organization	06

Table 3.3 provides the detail of organizations under each category of microfinance banks, microfinance institutions and rural support programs who reported their data for analysis. The last column of the table shows the total number of years for which MFIs reported their

data. The classification of the organizations is reported as per PMN and MIX market and is already discussed. Table 3.3 shows that there are nine microfinance banks, 24 MFIs, and 5 RSPs.

3.9 Data Analysis Methods

Descriptive analysis is used to initiate the data analysis procedure. The analysis follows a series of diagnostic tests and then panel data tests are performed for the results.

3.9.1 Descriptive Analysis

To initially summarize the data quantitatively, different statistical techniques are used. These involve the descriptive analysis of mean, median, standard deviation and the graphical description of data.

3.9.2 Diagnostic Tests

Several diagnostics are performed to check the data before using regression analysis. These tests include autocorrelation, multicollinearity, and homoscedasticity. According to Gujarati (2003), diagnostic tests are conducted to ensure that expected value is genuine and has a minimum value for a variance. After the approximation for diagnostic tests, appropriate panel data is available to run the regression analysis.

3.9.2.1 Auto-Correlation Test

Auto-correlation refers "to the correlation between members of a series of observations ordered in time (as in time series data) or space (as in cross-sectional data)" (Gujarati, 2003). Lagrange multiplier test is used to identify the autocorrelation in the model. Kiviet (1986) and Gujarati (2003) indicate that the Lagrange Multiplier test provides the best stats for both small and large data samples and is preferable.

3.9.2.2 Multicollinearity Test

Multicollinearity in a regression model is defined as the prevalence of a high, but not perfect, linear relationship between few or all independent variables (Gujarati, 2003). To diagnose the prevalence of multicollinearity, variance inflation factor, and pairwise correlation are approximated. If VIF value is above 10, it indicates that multicollinearity exists. On the other hand, Hair (2006) contend that a correlation coefficient below 0.9 may not cause serious multicollinearity problem.

3.9.2.3 Homoscedasticity Test

In the series of independent variables if error term variance is constant than homoscedasticity of data is confirmed (Hair, 2006). On the contrary, if the error term variance is not constant, it indicates heteroscedasticity problem in the data. Breusch-Pagan-Godfrey test is used for detecting heteroscedasticity problem. According to Gujarati (2003), for a normally distributed large data, Breusch-Pagan-Godfrey test provides best

results. If the above test provides significant results, heteroscedasticity would be confirmed by rejecting the null hypothesis for data homoscedasticity.

3.10 Summary

This chapter gives an overview of the research framework, development of hypotheses, sources of data, collection procedure of data. Furthermore, regression and moderated regression model for the study are presented. Additionally, descriptive statistics and diagnostic test that need to be performed before regression analysis are also discussed.

CHAPTER FOUR

EMPIRICAL FINDINGS AND DISCUSSIONS

4.1 Introduction

In this chapter, empirical findings from the data under study are reported, and results are discussed in detail. This chapter starts with the index measurement through Principal Component Analysis. Furthermore, descriptive statistics of the studied variable are discussed. Later, diagnostic tests and panel data tests are conducted. Next, the results are discussed in light of the previous studies and the hypothesis formulated for this study.

4.2 Sustainability Index Using Principal Component Analysis

In this study sustainability index is developed by assigning weights to the sustainability indicators using Principal Component Analysis (PCA). Four indicators including FSS, OSS, depth of outreach and breadth of outreach are used to determine the scores of sustainability for the respective years under study. The loadings for the variables are obtained using PCA. Asteriou and Price (2001) stated that loadings for the variables are chosen if they are not correlated. Table 4.2 shows the correlation matrix for the variables identified for the principal component analysis. The correlation matrix shows that the pairwise correlation among the variables is low. The financial sustainability variables of FSS and OSS have high comparative values of 0.84. According to Asteriou and Hall (2007), if the correlation coefficient value exceeds 0.9, it shows that there is an exact linear relationship among the variables. Hence this study considers the coefficient value of 0.9 as a benchmark to support that no correlation exists among the sustainability index variables.

Table 4.1
Correlation matrix for PCA

	FSS	OSS	ALPB	NAB
FSS	1	0.8477	-0.1254	0.2410
OSS	0.8477	1	-0.1599	0.1960
ALPB	-0.1254	-0.1599	1	0.0043
NAB	0.2410	0.1960	0.0043	1

Note: This table presents the pairwise correlation among all the variables used in measuring the sustainability index. FSS is the financial self-sufficiency ratio measured as the ratio of adjusted operating revenue to adjusted expense. OSS is the operational self-sufficiency ratio measured as the ratio of operating revenue to expense. ALPB is the proxy for the depth of outreach measured as the ratio of the gross loan portfolio to number of active borrowers. NAB is the proxy for the breadth of outreach measured as number of active borrowers.

Table 4.3 provides the component values for the variation in the group. The eigenvalue for component 1 as shown in the table is 1.9852. According to Asteriou and Price (2001), the eigenvalue for component 1 captivates the maximum proportion of variation. The total number of components is 4, and the number of observations reported is 273. Moreover, the proportion for component 1 is 0.4964 which is more than the remaining components.

Table 4.2
Principal components / correlation

Number of observations	273
Number of components	04
Trace	04
Rotation (unrotated = principal)	1.000
Rho	

Component	Eigenvalue	Difference	Proportion	Cumulative
Component 1	1.98552	0.979791	0.4964	0.4964
Component 2	1.00573	1.47311	0.2514	0.7478
Component 3	0.858418	0.708086	0.2146	0.9624
Component 4	0.150333	-	0.0376	1.0000

Note: This table presents the principal component eigenvalues.

Table 4.4 represents the principal component (eigenvectors). The weights for each of the individual variables assigned under component 1 are used in this study. The weight for FSS representing financial self-sufficiency is 0.6643. Operational self-sufficiency represented by OSS has assigned a weight of 0.6607. Moreover, ALPB representing the depth of outreach and NAB representing the breadth of outreach have -0.1905 and 0.2931 weights respectively.

Table 4.3
Principal component (eigenvectors)

Variable	Component 1	Component 2	Component 3	Component 4	Unexplained
FSS	0.6643	0.0272	0.2352	-0.7090	0.000
OSS	0.6607	-0.0357	0.2591	0.7036	0.000
ALPB	-0.1905	0.8289	0.5252	0.0275	0.000
NAB	0.2931	0.5576	-0.7757	0.0386	0.000

Note: This table presents the principal component (eigenvectors) weights for the indicators of sustainability. FSS is the financial self-sufficiency ratio measured as the ratio of adjusted operating revenue to adjusted expense. OSS is the operational self-sufficiency ratio measured as the ratio of operating revenue to expense. ALPB is the proxy for the depth of outreach measured as the ratio of the gross loan portfolio to number of active borrowers. NAB is the proxy for the breadth of outreach measured as number of active borrowers.

By assigning weights to the respective indicators, equation 3.2 takes the following form;

$$\mathrm{S.I}_{it} = (0.6643)\mathrm{FSS}_{it} + (0.6607)\mathrm{OSS}_{it} + (-0.1905)\mathrm{ALPB}_{it} + (0.2931)\mathrm{NAB}_{it} \quad (4.1)$$

The positive values for the weight assigned to FSS, OSS, and NAB indicates that these indicators contribute positively towards sustainability. Increase in FSS and OSS indicates that MFIs that tend to be more sustainable needs to focus on generating revenues by operating efficiently. As MFIs tend to increase the NAB their sustainability level also increase. The positive component value support that increases in the outreach of MFIs enhances sustainability. Additionally, negative component value of ALPB indicates that an increase in average loan balance per borrower would decrease the overall sustainability of MFIs.

According to Mersland and Strøm (2010), for an MFI, the risk associated with variation in the average size of the loan is unpredictable. Results of their study show that when loan size is small, MFIs would be more cost-effective. As the average loan size increase, it increases the average operational cost thus increasing the average profit of an MFI. However, Kumar Kar (2011) found that MFIs should be careful in increasing the size of

the loan as the risk associated with the loan also increases. Thus, the optimal size of the loan should be decided carefully. The increase in loan size also enhances the possibility of loan default as MFIs loans are collateral free which in the long run affects MFIs profitability. Moreover, MFIs with smaller ALPB usually reach a large number of poor clients which shows a better depth of outreach.

By using equation 4.1 sustainability score for MFIs are obtained from the year 2006-2015. Table 4.5 presents the descriptive statistics for the dependent variable. The number of observations using unbalanced panel data is 273. It is observed from the table that the mean score for SI is approximately equal to 0. The inclination of score towards the positive values indicates a higher sustainability level for MFIs in Pakistan for the year 2006-2015. The scores obtained for sustainability index are used further to determine the factors which affect MFIs sustainability.

Table 4.4
Descriptive statistics for sustainability index

Variable	Obs.	Mean	Std. Dev.	Min	Max
SI	273	0. 0000000238	1.000009	-2.29566	3.513061

Note: This table provides the descriptive statistics for the sustainability index. SI is the sustainability index measured by identifying weights of financial self-sufficiency, operational self-sufficiency, depth of outreach and breadth of outreach using principal component analysis.

4.3 Multiple Regression Analysis

This section provides descriptive statistics, diagnostic testing and results for the multiple regression analysis. Additionally, this section provides results for moderated regression analysis and discussion on the results.

4.3.1 Descriptive Statistics

In table 4.6 descriptive statistics are presented for the independent variables used in this study. The number of observations for each variable is presented in Column 2 of the table. This study used the unbalanced panel data. According to Quayes (2015), the unbalance data contains randomly missing values which do not pose any problem in the results. In this table, ROA, ROE, PAR>30, BPSM, OER, DER, and GLP are the independent variables used in this study. AGE and TA are the moderating variables used in this study.

As for profitability, the mean value for ROA is -0.0039 which indicates that on average MFIs in Pakistan are unable to generate positive income level by using its assets. The possible reason for negative ROA could be the diverse nature of the industry, having a high proportion of MFIs and rural support programs with dominating social performance goals. This value of ROA is lower than 0.03 value reported by Daher and Le Saout (2015) for 362 MFIs from73 countries between 2005-2011 and higher from -0.068 reported by Qayyum and Ahmad (2006) for Pakistan. The mean value reported by Adhikary and Papachristou (2014) for ROA is -0.043 when he studied 113 MFIs in a panel of South Asian countries from 2003 to 2009. The mean value of ROE for the current study is 0.196 or 19.6 percent for MFIs in Pakistan. Positive value for ROE indicates that MFIs in Pakistan are generating positive returns by utilizing their equity. This value is much higher than the mean value of -0.043 for Pakistani MFIs, -1.091 for Indian MFIs and 0.194 for MFIs in Bangladesh, reported by Qayyum and Ahmad (2006). Zerai and Rani (2012) reported a mean ROE value of 0.115 for MFIs in India during 2009.

The portfolio quality presented by PAR>30 has a mean value of 0.0485 or 4.85 percent indicating the portion of the portfolio whose payments are more than 30 days past due. A higher number is a potential sign of trouble. The portfolio at risk should be below 10 percent once an MFIs loan portfolio is operating efficiently (Nyamsogoro, 2010). The mean value for PAR>30 is much lower than 0.061 mean value of 362 MFIs studied by Daher and Le Saout (2015). Additionally, Louis *et al.* (2013) studied 650 MFIs from 88 countries and found the mean value of PAR>30 is 0.06. Moreover, Adhikary and Papachristou (2014) also found that mean value for PAR>30 is 0.061 for 113 MFIs of South Asian countries during the time-period of 2003 to 2009.

Borrower per staff member assesses staff productivity. The higher ratio indicates a more productive staff, as they handle more borrowers. The maximum value of 586 borrowers indicates that MFIs in Pakistan are efficiently using its staff members to increase outreach. Additionally, the mean value of BPSM for MFIs in Pakistan is 139 which is lower than the BPSM of 176.01 studied by Adhikary and Papachristou (2014) for 113 MFIs in South Asia. Furthermore, efficiency ratios explain whether an MFI is serving as many customers as possible while keeping its costs under control. The mean value for OER reported in the current study is 0.17 or 17 percent. The lower OER indicates that MFIs are more efficient in generating profits. This ratio is much lower than the OER of 26.2 percent reported by Kar (2012).

Table 4.5
Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	273	-0.003	0.094	-0.585	0.244
ROE	273	0.196	0.989	-2.296	8.333
PAR > 30	273	0.048	0.112	0	0.834
BPSM	273	139.76	91.715	0.223	586.0
OER	273	0.172	0.156	0.015	1.282
DER	273	2.618	9.635	-51.09	60.807
GLP	273	1417212	2855304	649	24612129
AGE	273	12.992	7.295	0	29
TA	273	2214927	3737322	10295	26696346

Note: The descriptive statistics for both dependent and independent variables are presented in this table. ROA is the proxy used for the profitability and is measured as the ratio of net operating income after tax to the average asset. ROE is the proxy used for profitability and is measured as the ratio of net operating income after tax to average equity. PAR>30 is the proxy used for portfolio quality and is measured as the ratio of unpaid principal balance overdue 30 days to the gross outstanding loan portfolio. BPSM is the borrower per staff member, a proxy for productivity, measured as the ratio of a total number of active borrowers to number of loan officers. OER is operating expense ratio and is measured as a total operating expense to average assets. DER is the debt to equity ratio and is measured as the ratio of total debt to total equity. LNGLP is the logarithm of the gross loan portfolio. LNAGE is the logarithm of age. LNTA is the logarithm of total assets and is a proxy for size.

The mean value for GLP in the current study as reported in table 4.6 is PKR 1417 million for MFIs in Pakistan using data from 2006-2015. The gross loan portfolio is the main source of income to MFIs and thus, higher the loan, higher the interest revenue and profits. The variation in the amount of gross loan portfolio indicates that the microfinance industry is indeed highly disproportionately distributed. The mean value for DER reported in Table 4.6 is 2.618. There is a big gap between the minimum (-51.09) and maximum (60.80) value of DER. Again, the variation in DER shows that only very few MFIs in the industry are performing well. DER gives a measure of how much of the company's worth is funded through debt and how much through equity. A ratio of greater than 1 means that MFI has less equity than total liabilities; a ratio of greater than 0 but less than 1 means that MFI has more equity than total liabilities. These rules apply, only as long as MFI has positive equity. A negative DER would indicate that many MFIs have negative equity when total liabilities exceed total assets. This suggests that MFIs depend heavily on borrowings and subsidized

funds for lending. It leads to having negative equity since they do not earn enough revenue to cover total costs. A high value for DER could indicate that MFI has financed its growth with debt, reducing its ability to absorb unexpected losses. A negative value for DER for some MFIs is due to negative book value of equity which points to financial issues. This value is much higher than DER mean value of 1.316 for Pakistan MFIs, but lower than 16.541 for Indian MFIs and 9.052 for MFIs in Bangladesh, reported by Qayyum and Ahmad (2006). DER reported by Louis *et al.* (2013) considering 650 MFIs from 88 countries for the year 2011 is 4.135. Bhanot *et al.* (2015) reported the mean value of 6.98 for DER of MFIs in India.

Age and size are the symbols of growth and maturity of MFIs. AGE represents the number of years MFIs have been in operation. The mean value for the age in current data is approximately 13 years. Bhanot *et al.* (2015) reported the mean value for AGE is 10.44 for MFIs in India. On the other hand, TA representing size has the mean value of PKR 2214 million. Overall, it is observed that there are no large variations among the data reported by MFIs over the study period. This is evidenced by small standard deviations of the variables. Other than DER which have a standard deviation of 9.63, remaining variables have reported a more stable standard deviation that is between 0.09 to 0.98. The small variations in the variables could be due to the strict monitoring by the regulator in strengthening the microfinance sector especially for the achievement of the Millennium development goal.

4.3.2 Diagnostic Testing

Before analyzing the data for the regression analysis, a series of diagnostics is done to fulfill the BLUE (best linear unbiased estimation) condition. Data is tested for the existence of multicollinearity, homoskedasticity and autocorrelation problem.

Table 4.6

Correlation matrix

	SI	ROA	ROE	PAR>30	BPSM	OER	DER	GLP	AGE	TA
SI	1.000									
ROA	0.704	1.000								
ROE	0.103	-0.016	1.000							
PAR>30	-0.257	-0.182	0.053	1.000						
BPSM	0.290	0.253	0.124	-0.127	1.000					
OER	-0.170	-0.328	0.154	-0.042	-0.204	1.000				
DER	0.062	0.095	-0.191	-0.042	0.021	-0.133	1.000			
GLP	0.187	0.104	0.088	-0.131	0.051	-0.109	-0.195	1.000		
AGE	0.339	0.275	0.050	-0.043	0.400	-0.162	0.124	-0.036	1.000	
TA	0.222	0.137	0.019	-0.129	-0.024	-0.140	-0.036	0.786	-0.118	1.000

Note: This table presents the correlation coefficients among both the dependent and independent variables. SI is the sustainability index measured by identifying weights of financial self-sufficiency, operational self-sufficiency, depth of outreach and breadth of outreach using principal component analysis. ROA is the proxy used for the profitability and is measured as the ratio of net operating income after tax to the average asset. ROE is the proxy used for profitability and is measured as the ratio of net operating income after tax to average equity. PAR>30 is the proxy used for portfolio quality and is measured as the ratio of unpaid principal balance overdue 30 days to the gross outstanding loan portfolio. BPSM is the borrower per staff member, a proxy for productivity, measured as the ratio of a total number of active borrowers to number of loan officers. OER is operating expense ratio and is measured as a total operating expense to average assets. DER is the debt to equity ratio and is measured as the ratio of total debt to total equity. LNGLP is the logarithm of the gross loan portfolio. LNAGE is the logarithm of age. LNTA is the logarithm of total assets and is a proxy for size.

Correlation Matrix is reported in research studies to identify the multicollinearity among the explanatory variables. According to Asteriou and Hall (2007), if the correlation coefficient value exceeds 0.9, it shows that there is an exact linear relationship among the variables.

Taking this as the benchmark, the table 4.7 shows that the pairwise correlations among the regressors are relatively small. Hence, multicollinearity should not be of concern in this study. Pairwise correlation coefficients among the variables such as ROA and SI, and GLP and TA are relatively higher, but still, they are lower than the benchmark of 0.9, suggested by Asteriou and Hall (2007).

The non-existence of multicollinearity in our data is also confirmed by the variance inflating factor (VIF) calculated for this study. Increase in collinearity of the variables increases the VIF. If there is no collinearity, the VIF is 1. Regarding the VIF, Gujarati (2004) states a rule of thumb, suggesting that if VIF is more than 10 than the variable is said to be highly collinear. Table 4.4 shows that VIF for all proxies of SI is lower. Hence multicollinearity is not an issue in our model. Briefly, both pairwise correlation and VIF confirm the non-existence of multicollinearity in our model.

Table 4.7
Variance inflating factor

Variable	Centered VIF
C	NA
ROA	1.217
ROE	1.121
PAR > 30	1.202
BPSM	1.130
OER	1.274
DER	1.068
LNGLP	1.248

Breusch-Pagan-Godfrey test, which is used to detect the existence of heteroscedasticity problem in the model is found to be significant, indicating the existence of the problem of heteroscedasticity in the model. The F-statistics indicates the significance level of less than 5% and supports the alternative hypothesis.

Table 4.8
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistics	1.402	Prob. F(7,265)	0.204
Obs R-squared	9.753	Prob. Chi-Square(7)	0.203
Scaled explained SS	24.277	Prob. Chi-Square(7)	0.001

Table 4.10 provides the results for the autocorrelation in the data. The significance of the Breusch-Godfrey, serial correlation LM test, shows that the problem of autocorrelation exists in the data. The problem of heteroskedasticity and autocorrelation is resolved by White-Cross section later.

Table 4.9
Breusch-Godfrey Serial Correlation LM Test

F-statistic	54.859	Prob. F(1,264)	0.0000
Obs*R-squared	46.969	Prob. Chi-Square(1)	0.0000

4.3.3 Hausman Test

Fixed and random effect techniques are mostly used for the panel data analysis. To check for the fixed or random effect, several tests are conducted. The likelihood ratio test is applied to the data to select among ordinary regression or fixed effect regression. Likelihood ratio test results are presented in table 4.11. The result shows the value of $p<0.01$, indicating that the appropriate model is a fixed effect.

Table 4.10
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
F Value	3.517	-37,228	0
Chi-square Value	123.286	37	0

The decision of whether random effects or fixed effects should be used is made using the Hausman test (Table 4.12). The null hypothesis of the Hausman test is that the preferred model is random effects, as opposed to the alternative hypothesis that the fixed effects model should be used. At a 0.05 significance level, the null hypothesis that the preferred model is random effects is rejected in favor of the alternative hypothesis that the fixed effects model is preferred. Therefore, the fixed effects model is used for our panel regression.

Table 4.11
Test cross-section random effects-Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Random	20.729	7	0.004

4.3.4 Estimation Results- Fixed Effect Regression

To handle the problem of auto-correlation and heteroskedasticity, GLS estimation is used in this study for the regression analysis. GLS is a transformed model of OLS, and it is more

appropriate than OLS when there is some problem in the data (Gujarati, 2003). White cross-section standard error and covariance are conducted to tackle auto-correlation problems, while the fixed effect (FE) model is used as it is found from the Hausman test to be the most appropriate model. Millson (2013), Kipesha and Zhang (2013), and (Quayes, 2015) have also used FE estimation while studying the sustainability of MFIs in their study. Sustainability of MFIs, measured by using SI, is the dependent variable used in this study. The study used multiple regression analysis to identify the impact of different independent variables on SI. In the next section, the results of the FE estimation are presented, while the explanation and discussion of the results are presented in the subsequent section. Additionally, the interaction effect of the variables suggested by life cycle theory, and the discussion of the results are also discussed in the subsequent sections.

Table 4.13 presents the results of fixed effect estimation on the relationship of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio with MFIs sustainability using SI. The coefficient estimation (β) in column two shows the contribution of each independent variable on the sustainability of MFI. The sign (-, +) of beta coefficient (β) defines the direction of effect of the independent variable to the dependent variable. Moreover, column three shows the ρ-value, representing the significance of each variable and is used for the decision, to accept an alternative hypothesis or to reject an alternative hypothesis.

The significance of the model reported by F-statistics in table 4.13 clearly shows that the fixed effect estimation model is strongly significant. The result indicates that there is a relationship between the set of independent variables and SI. The adjusted R^2 value shows

that the estimation model consisting of profitability, portfolio quality, productivity, efficiency, liability management, and gross loan portfolio explain 63.31 (0.633) percent variation in SI.

Table 4.13 reports the fixed effect estimation results using the sustainability index. The positive β coefficient of ROA indicates that there is a strong positive relationship between ROA and sustainability at a significance level of 1 percent. One-unit change in ROA may increase the sustainability of MFI by 5.98. This finding is consistent with the view that to achieve sustainability, MFIs have to be financially more efficient. The plausible reason for this could be that MFIs in Pakistan are efficiently utilizing their assets to generate positive income which helps them to enhance their operations and grow efficiently. Since return on asset is a measure of profitability which determines MFIs ability to generate positive returns by efficiently utilizing its assets and continue to grow in the future. The revenues generated by operating efficiently may be used for future investment to increase its loan portfolio. This would help MFIs to increase their outreach and become less dependent on external funds and equity borrowings. The results of this study are similar to other studies such as Bhanot *et al.* (2015) for MFIs in India, and Crabb (2008) for MFIs in 90 countries.

Table 4.13 shows that return on equity (a proxy for profitability) has a significant impact on the sustainability of MFIs. The estimation results indicate that ROE influence sustainability at a significance level of 5 percent. These results outweigh the assumptions put forward by Tucker and Miles (2004) that MFIs with positive ROE may be attaining those results by reducing the level of services to the poorest people. Significance of ROE in achieving sustainability (measured using double bottom line) is evident from the results

obtained. The possible reason could be that MFIs stands to benefit from equity because it reduces its cost of capital hence reducing its cost of loans and thereby attracting more borrowers and attaining sustainability in the long run. Potential shareholders only invest when they believe there is a return to be earned and therefore regulatory requirements to have audited financial statements are expected to enhance the MFI's financial profile and thereby attracting more equity.

The estimation results in table 4.13 show that portfolio at risk greater than 30 days (PAR>30), a proxy of portfolio quality have an insignificant relationship with SI. Overall, the PAR > 30 days continues to remain below the 5 percent cutoff point reflecting that portfolio quality is good. According to the Pakistan Microfinance report 2012, despite the uncertain macroeconomic situation and floods in 2010 and 2011 MFIs in Pakistan were able to manage their portfolio at risk below 5 percent. Moreover, during 2012, PMN, launched Microfinance Credit Information Bureau to facilitate the sector in managing credit risk and assessing the true creditworthiness of existing and prospective micro-credit clients, which have helped MFIs to manage their loan portfolio better. Additionally, it also points towards the fact that players are risk averse and there is still plenty of opportunity in the market for growth in outreach. These may be the possible reason that portfolio quality does not influence the sustainability of MFIs in Pakistan.

Results of fixed effect estimation reported in table 4.13 find that borrower per staff member, a proxy for productivity, have a significant positive relationship with sustainability. This implies that MFIs staff can reach more poor clients. The staff should be kept motivated to achieve higher sustainability level. Ayayi and Sene (2010) supported

the results of this study and found that BPSM is significant across all the regions except Sub-Saharan Africa. The results of this study are also supported by Bhanot *et al.* (2015) and Twaha and Rashid (2012) for MFIs in India. Additionally, the increase in the value of BPSM implies that MFIs are reaching more poor people, instead of wealthier clients. Given that outreach to the poor is associated with small loans, increase in BPSM shows that MFIs staff are reaching the relatively poor client. Thus, MFIs staff should be kept motivated with institution goal of serving the very poor to keep MFIs moving up the sustainability ladder.

Efficiency measured by operating expense ratio has an insignificant relation with the sustainability of MFI. The coefficient value for the relationship between efficiency and sustainability is not significant even at 10 percent. This implies that the efficiency of MFIs does not affect the sustainability of MFI. The plausible reason could be that MFIs in Pakistan have shifted from paper intensive and timely mechanisms to the use of advanced technology. Data reporting and maintaining reconciliation statements were time taking and hinders the communication and interaction among loan officers, branch officers, and head office. MFIs in Pakistan have stepped up to the use of computers and the latest banking software's which have helped them to overcome the effect of high administrative costs. According to Rozzani *et al.* (2013), many bank officials agree that usage of technology has helped in reducing the transaction cost, total cost, and bad debts. Thus, the advancement in technology has reduced the operating expense ratio manifold. Additionally, MFIs in Pakistan have advanced towards new banking technology, such as charge cards, ATMs, and branchless banking which help them to reduce costs and improve the delivery of services. Pakistan has recently been recognized to be one of the fastest growing branchless banking markets in the world (Rozzani *et al.*, 2013), with an increasing number of

partnerships between MFIs and branchless banking providers. Thus, higher operating expense may no longer be an issue for MFIs in Pakistan due to the above possible reasons. The insignificant relationship between efficiency and sustainability of MFIs is in line with the results of the study by Tucker and Miles (2004).

Table 4.12
Fixed effect Estimation Results

Variable	Coefficient	Prob.
ROA	5.98***	0
ROE	0.063**	0.029
PAR>30	-0.85	0.131
BPSM	0.001**	0.040
OER	0.186	0.579
DER	0.001	0.704
LNGLP	0.063***	0.004
R^2	0.633	
Adjusted R^2	0.610	
F-statistic	27.611***	

Note: ***, **, * shows significance at 1%, 5% and 10% respectively.

Table 4.13 shows that debt to equity ratio has an insignificant positive relation with the sustainability of MFI. One of the possible reasons may be that debt financing is not common in MFIs because they focus more on mitigating poverty, and commercial lenders in Pakistan are reluctant to lend for such highly risky business. Moreover, Lenssen *et al.* (2014) provide a possible explanation for this result. They argue that various combinations of capital do not improve the financial sustainability of the MFIs. Another possible reason could be that long-term debts are relatively more expensive, and therefore employing high proportions of them could lead to low profitability. Additionally, borrowings or debt generally cannot effectively exert pressure on MFI-management, on the whole, to lead to more returns on equity capital as they are socially driven. Thus, DER does not seem to effect the sustainability of MFIs. Similar results were observed by Kinde (2012) for the Ethiopian MFIs, and Rai and Rai (2012) for Indian MFIs.

Additionally, LNGLP has a β coefficient value of 0.063 and has a strong significant relationship with the sustainability of MFIs at 1 percent. This indicates that a unit change in LNGLP increases the value of sustainability by 0.063. The positive and significant coefficients of gross loan portfolio suggest that as MFIs increase their focus on lending, they tend to have better outreach level which helps them in extracting premiums from the loans previously disbursed. This premium then contributes to the firm's income flow and profitability that could later be used for debt-servicing. Again, the increase in gross loan portfolio enables MFIs to enjoy economies of scale because of the reduction in the average cost of operation. Furthermore, an increase in GLP could also lead to product diversification for diverse clientele groups and this enables an MFIs to cushion itself against risk.

The results obtained from Table 4.13 provide a decision on the hypothesis of the influence of ROA, ROE, PAR>30, BPSM, OER, DER, and LNGLP on the sustainability of MFIs and are presented in Table 4.14. Column three of Table 4.14 shows the decision of acceptance and rejection of these hypothesis.

Table 4.13
Hypothesis findings

Sr.no	Hypothesis	Decision
Hypothesis 1	ROA (profitability) and sustainability are related significantly.	Supported (significant at 1%)
Hypothesis 2	ROE (profitability) and sustainability are linked significantly.	Supported (significant at 5%)
Hypothesis 3	Portfolio quality measured by PAR>30 days and sustainability is linked significantly.	Not Supported
Hypothesis 4	Productivity measured by BPSM and sustainability are related significantly	Supported (significant at 5%)
Hypothesis 5	OER (efficiency) and sustainability are related significantly	Not Supported
Hypothesis 6	Liability management approximated by DER and sustainability are linked significantly	Not Supported
Hypothesis 7	GLP and sustainability are linked significantly	Supported (significant at 1%)

4.3.5 Estimation Results-Moderating Effect of Age

The estimation results of the interaction effect of age on the relationship between profitability, portfolio quality, productivity, efficiency, liability management, gross loan portfolio and sustainability of MFIs is done by using moderated multiple regression analysis in a fixed effect model. White Cross-section with GLS estimation is used to tackle the auto-correlation problem in the data.

Table 4.15 presents the results of fixed effect estimation with the interaction effect of age on the relationship of ROA, ROE, PAR>30, BPSM, OER, DER, and GLP with MFIs sustainability using SI. Model 1 tests the relationship between the independent variables, moderator and SI. The result shows that logarithm of age of MFIs is statistically significant at 5 percent level. The coefficient value of 0.132 with a positive sign shows that as MFIs age increases, the sustainability of MFIs also increases. The results are aligned with life cycle theory which shows that as MFIs age increase they tend to be more sustainable (Nyamsogoro, 2010). This implies that as MFIs mature, learning-by-doing help them

increase their likelihood of attaining financial sustainability. This implies that MFIs gradually improve their control over all operations related to the issuance of microcredit. In other words, MFIs that have considerable experience in the microfinance sector have diligently applied credit risk management and general efficient management techniques to attain financial sustainability. Young MFIs are usually inexperienced, have higher operating cost, and low market penetration. The finding of the current study is consistent with the Nurmakhanova *et al.* (2015) for 71 countries and Rahman and Mazlan (2014) for MFIs in Bangladesh.

Model 2 shows the results of the interaction of age and ROA on SI. The F-statistics of the model are found to be significant. Change in R^2 for model 2 is 0.0005, indicating the significant effect of age as an interaction variable in the model. The positive change in R^2 indicates the existence of interaction effect (Baron & Kenny, 1986). The coefficient of RAO*LNAGE is positive with a value of 0.370, but it is statistically insignificant. Model 3 shows the interaction of age and ROE on the sustainability of MFIs. The significance of the model is confirmed with F-statistics. Moreover, change in R^2 value of 0.003, indicating that interaction of age is significant. The coefficient value for ROE*LNAGE is -0.085, indicating that the interaction effect of age on the relationship between ROE and sustainability is negative. As presented in table 4.15, F-statistics for Model 4 (interaction of LNAGE and PAR>30) shows that the overall model is significant with a change in R^2 value of 0.022. The coefficient value for PAR>30*LNAGE is -2.148 and is strongly significant at 1 percent. Model 5 presents the results of the interaction of age and BPSM on SI. F-statistics shows that the overall model is significant. The interaction model finds the R^2 change in the model is significant. Moreover, BPSM*LNAGE has a weaker

significant relationship with the sustainability of MFIs at 10 percent, with a coefficient value of -0.001.

In table 4.15, F-statistics value of 25.111 and R^2 change value of 0.0007 for Model 6 indicates that the overall model is significant, but the interaction term OER*LNAGE is statistically insignificant. This indicates that OER*LNAGE has an insignificant relationship with SI. Similarly, Model 7 shows that DER*LNAGE has a negative coefficient. DER*LNAGE are found statistically significant at 5 percent. The change in R^2 value of the model is 0.006, indicating that the interaction term DER*LNAGE is significant.

Model 8 shows the results for the interaction term LNGLP*LNAGE on SI. The F-statistics for the model is found statistically significant with a change in R^2 value of 0.011. The coefficient value of LNGLP*LNAGE is -0.077. Moreover, the interaction of age on the relationship between LNGLP and sustainability is found to be strongly significant at 1 percent. The result implies that age moderates the relationship between gross loan portfolio and sustainability, but it weakens the strength of the relationship due to the negative value of the coefficient.

Table 4.14

Estimation Results-Interaction of MFIs age

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
ROA	5.898***	4.927***	5.943***	5.881***	5.709***	5.870***	5.914***	5.878***
	(0.000)	(0.005)	(0.000)	(0.00)	(0.000)	(0.000)	(0.000)	(0.000)
ROE	0.059**	0.055**	0.263***	0.074**	0.053**	0.051*	0.082***	0.065***
	(0.035)	(0.044)	(0.001)	(0.019)	(0.036)	(0.052)	(0.005)	(0.005)
PAR>30	-0.853	-0.864	-0.797	4.015***	-0.802	-0.877	-0.926*	-0.847
	(0.144)	(0.129)	(0.174)	(0.000)	(0.173)	(0.134)	(0.098)	(0.186)
BPSM	0.0006	0.0006	0.0006	0.0008	0.004**	0.0006	0.0005	0.0005
	(0.168)	(0.15)	(0.197)	(0.100)	(0.020)	(0.187)	(0.231)	(0.220)
OER	0.247	0.235	0.152	0.201	0.210	0.922	0.239	0.154
	(0.479)	(0.492)	(0.600)	(0.513)	(0.532)	(0.121)	(0.506)	(0.613)
DER	0.0004	0.0005	0.002	0.0004	-0.0005	0.0004	0.027**	-0.0001
	(0.910)	(0.891)	(0.561)	(0.904)	(0.897)	(0.904)	(0.034)	(0.975)
LNGLP	0.070***	0.071***	0.070***	0.072***	0.060***	0.068***	0.065***	0.242***
	(0.002)	(0.002)	(0.004)	(0.001)	(0.008)	(0.002)	(0.003)	(0.0003)
LNAGE	0.132**	0.142**	0.135**	0.207***	0.289**	0.192**	0.148***	1.101***
	(0.020)	(0.022)	(0.016)	(0.0004)	(0.013)	(0.017)	(0.007)	(0.002)
RAO*LNAGE	-	0.370	-	-	-	-	-	-
		(0.596)						
ROE*LNAGE	-	-	-0.085**	-	-	-	-	-
			(0.018)					
PAR>30*LNAGE	-	-	-	-2.148***	-	-	-	-
				(0.000)				
BPSM*LNAGE	-	-	-	-	-0.001*	-	-	-
					(0.054)			
OER*LNAGE	-	-	-	-	-	-0.320	-	-
						(0.292)		
DER*LNAGE	-	-	-	-	-	-	-0.012**	-
							(0.025)	
LNGLP*LNAGE	-	-	-	-	-	-	-	-0.074***
								(0.002)
R^2	0.640	0.641	0.643	0.663	0.647	0.641	0.647	0.651
Adjusted R^2	0.616	0.615	0.618	0.639	0.622	0.615	0.622	0.627
Change in R^2	-	0.0005	0.003	0.022	0.007	0.0007	0.006	0.011
F-statistic	26.611***	25.099***	25.379***	27.690***	25.820***	25.111***	25.807***	26.333***

Note: ***, **, * shows significance at 1%, 5% and 10% respectively

The results obtained from Table 4.15 provide a decision on the hypothesis of the influence of age on the relationship of ROA, ROE, PAR>30, BPSM, OER, DER, and LNGLP on the sustainability of MFIs and are presented in Table 4.16. Column three of Table 4.16 shows the decision of acceptance and rejection of these hypothesis.

Table 4.15
Hypothesis findings

Sr.no	Hypothesis	Decision
Hypothesis 8	Age of MFIs has a moderating effect on the relationship between profitability (ROA) and sustainability	Not Supported
Hypothesis 9	Age of MFIs has a moderating effect on the relationship between profitability (ROE) and sustainability	Supported (significant at 5%)
Hypothesis 10	Age of MFIs moderates the relationship between portfolio quality (PAR>30 days) and sustainability	Supported (significant at 1%)
Hypothesis 11	Age of MFIs moderates the relationship between productivity (BPSM) and sustainability	Supported (significant at 10%)
Hypothesis 12	Age of MFIs moderates the relationship between efficiency (OER) and sustainability	Not Supported
Hypothesis 13	Age of MFIs moderates the relationship between liability management (DER) and sustainability	Supported (significant at 5%)
Hypothesis 14	Age of MFIs moderates the relationship between GLP and sustainability	Supported (significant at 1%)

4.3.6 Discussion on the results of moderating effect of Age

This section presents and discusses the findings regarding the moderating effect of age on the relationship of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio and sustainability (measured using sustainability index) of MFIs. Following is the variable wise discussion of the results.

4.3.6.1 Moderating effect of Age on the relationship between Profitability (ROA) and Sustainability

The hypothesis developed by this study is that the age of MFIs has a moderating effect on the relationship between ROA and sustainability. The regression results did not support this hypothesis and found that age does not moderate the relationship between ROA and sustainability.

The possible reason could be that as MFIs tend to get mature, surprisingly, asset utilization ratio has little or no impact on the net income (Basharat *et al.*, 2014). One of the reasons for the insignificant relationship could be that as MFIs in Pakistan are getting matured, the asset utilization ratio of the microfinance industry in Pakistan is irrelevant to their age. Although asset utilization ratio of MFIs in Pakistan is low as compared globally (Pakistan Microfinance Network, 2014). The hypothesis results may also be supported by the arguments of Gonzalez and Rosenberg (2006) who found that the growth of MFIs is not linked to profitability, at least once the MFIs gets beyond its early years and a modest level of clientele. The majority of MFIs in Pakistan have already achieved the maturity stage as the average age of MFI is 13 years, with few new entrants. According to life cycle theory, when MFIs are at the growth stage, availability of more opportunities and less profitability at growth stage enables MFIs to choose a sustainable project. Whereas, mature MFIs have more profitability but fewer opportunities and therefore they are more likely to over-invest by providing repeated loans. These could be the possible reason for the insignificant moderating effect of age on the relationship between ROA and sustainability.

4.3.6.2 Moderating effect of Age on the relationship between Profitability (ROE) and Sustainability

Regression result suggests that the null hypothesis for the age of MFIs does not moderate the relationship between ROE and sustainability of MFIs is rejected. This accepts the alternate hypothesis that the age of MFIs has a moderating effect on the relationship between ROE and sustainability. Moreover, the result further suggests that the interaction term ROE*AGE has a significant negative relationship with sustainability. The interaction term is statistically significant at 5 percent.

These results imply that as MFIs tend to get mature, increase in ROE negatively influence the sustainability of MFIs. The results of this study are in line with Life cycle theory. According to the theory, when MFIs are at growth stage, they face fewer governance issues and high investment opportunities. However, at maturity, there are possibilities that governance issues are creating hindrance to place funds. Due to internal conflicts, managerial discretions lead to personal gains. The poor investments and mishandling of funds may lead towards poor sustainability of MFI. According to Dickinson (2011), as firms mature they pay down their debt or repurchase equity resulting in negative financing which negatively influences their sustainability. These may be possible explanations of the above result.

As firms become older, they often try to formalize decision-making procedures, which makes them very bureaucratic, reduces organizational flexibility and the ability for prompt changes. Rigid rules and procedures can be very large obstacles for organizational changes

and innovation which are crucial in the modern globalized and very competitive business environment. Also, with the age firms might pursuit the strategy of "quiet life" and consequently avoiding risks (large R&D investments), large restructuring, conflicts with employees, etc. Avoidance of organizational changes and R&D investments in long term results in losing the competitive advantages and decreased performance. In line with this reasoning, a negative influence of this variable on profitability is anticipated.

4.3.6.3 Moderating effect of Age on the relationship between Portfolio Quality (PAR>30 days) and Sustainability.

The current study hypothesized that age of MFIs moderates the relationship between PAR>30 and sustainability. Regression result suggests that the interaction effect of age and PAR>30 has a negative relationship with the sustainability of MFIs and is significant at 1 percent. This shows that the null hypothesis for the study is rejected and the alternative hypothesis is strongly accepted.

According to life cycle theory, during the maturity stage market is no longer growing. All the competitors are going after the same group of customers which result in repetition and decline in quality of portfolio (Miller & Friesen, 1984). In this context, MFIs were only able to expand their shares in the market by squeezing out others' shares by multiple borrowings or cross membership (Mia *et al.*, 2017). Financing in the saturated market negatively affects portfolio quality. The same is supported by Gonzalez and Rosenberg (2006) argument that, as market penetration rate exceeds 8 percent of the total population, portfolio quality diminishes. In Pakistan, the microfinance sector on average has the market

penetration rate above 11 percent, which is high above the threshold estimated by Gonzalez (2010). This implies that maturity negatively impacts the portfolio quality of MFIs and results in raising exposure to risky loans. A high portfolio-at-risk limit the revenue derived from microcredit operations and therefore decrease the amount of lendable funds. This led to the rationing of credit and ultimately the inability to sustainably supply quality services to the clientele and have a negative impact on MFIs' financial results and hence their sustainability. These could be the possible reasons that as MFIs mature portfolio quality negatively affect sustainability.

4.3.6.4 Moderating effect of Age on the relationship between Productivity (BPSM) and Sustainability.

The estimated coefficients for the moderating effect of age on the relationship between BPSM and sustainability is statistically significant at 5 percent. This indicates that the null hypothesis for the study is rejected and the alternate hypothesis is accepted.

According to table 4.13, the direct relations between staff productivity and sustainability is significantly positive. In general, this indicates the increase in number of loans per staff member increases the sustainability of MFIs. However, as MFIs get mature, staff productivity tends to negatively influence the sustainability of MFIs in Pakistan as shown in Table 4.15. The results of the current study are in line with the life cycle theory. These results are further supported by the findings of Masurel and Van Montfort (2006) that staff productivity increases during the early stages of the life cycle and decreases as firms get mature. As an MFI mature, its grants and low-interest loan may be suspended or reduced.

That would provide an impetus to access capital from outside, decreasing the productivity and leading to a decrease in the yield rate. According to Pakistan Microfinance Network (2017), MFIs in Pakistan may have low staff productivity because middle managers lack clear visibility on career progression opportunities within the organization and the pay scales are very low due to which MFIs find it difficult to retain employees. Performance appraisal systems are not linked to learning and development initiatives. There is a lack of proper training infrastructure, and organizations find it difficult to provide specific soft skills training due to limited training budgets. These may be the possible reason that the interaction effect of age on the relationship between staff productivity is significantly negative.

4.3.6.5 Moderating effect of Age on the relationship between Efficiency (OER) and Sustainability

The current study hypothesized that age moderates the relationship between efficiency and sustainability of MFIs. However, the results of the regression model suggest that the interaction effect of age on the relationship between efficiency and sustainability is insignificant.

It is evident from Table 4.6 that MFIs in Pakistan have an average age of 13 years. This implies that the majority of MFIs have attained possible benefits of the passage of time on their sustainability performance. As pointed out by Schreiner *et al.* (1996), lending technology is proven and improved through several years of experimentation, development, and adjustment. According to Gonzalez (2007a), it seems reasonable to

assume that MFIs build up a solid customer base in their early years of existence, which significantly translates into greater efficiency. In subsequent years, this trend is still positive but begins to level off, as most internal processes have already been tested and improved. MFIs in Pakistan may have accumulated a stock of information capital about the clientele and environment, have developed client relationships, and have identified well-performing clients.

Moreover, MFIs in Pakistan have good market repute among the clients, good relations with international networks and have enjoyed the resulting technology transfers. All the above represent benefits or sources of increased efficiency. Thus, there are good reasons to expect MFIs that have been in operation longer to be able to reduce costs through learning by doing (Caudill *et al.*, 2009). The results indicate that mature MFIs are in a better position to avoid operating cost by shifting from manual banking operations to technology-driven systems. Therefore, operating cost is not a trivial factor for determining MFIs sustainability.

4.3.6.6 Moderating effect of Age on the relationship between Liability Management (DER) and Sustainability.

The null hypothesis that the age of MFIs moderates the relationship between DER and sustainability is rejected. Results of the current study show that the age of MFIs moderates the relationship between DER and sustainability of MFIs in Pakistan at a significance level of 5 percent.

The results are in line with the life cycle theory. Providing a regular loan to a start-up firm is usually too risky, so in the early stages of its financial life, MFIs use private equity, non-commercial lending, and retained revenues to get going. Debt generally comes into play at a later stage in the financial growth cycle of a company. Prabhu (2011) opines that when hectic growth and expansion plans are pursued by MFIs, they need commercialized funds from equity and debt investors. Such commercialized MFIs have to face the pressure to meet the return expectations of debt and equity investors and this, in turn, make them influence the behavior of MFIs staff adversely. Levy of exorbitant interest rates, multiple lending, and coercive loan recovery practices may be the means adopted by the staff to meet the growth and return expectations of the owners and investors. All these practices though earned short-run profits for MFIs, but they deviate them from its social goal. This may, in turn, result in less outreach and also increase the portfolio at risk. Resultantly, it affects the sustainability in the long run. These problems associated with growth can be rectified only if MFIs have a clear vision to achieve steady growth, without deviating from its social goal. Furthermore, Fehr and Hishigsuren (2006) posited that the capital structure of MFIs changes with the LCT phases of an MFI. Conditions set by capital providers do not allow MFIs to have many choices. Besides, leverage may also raise the creditor-owner conflict, thereby raising agency cost resulting in a negative influence on sustainability. These may be the possible reason that the interaction effect of DER*LNAGE has a negative relationship with sustainability.

4.3.6.7 Moderating effect of Age on the relationship between GLP and Sustainability.

The significant relationship between interaction term LNGLP*LNAGE and sustainability of MFIs in Pakistan shows that age moderates the relationship between GLP and sustainability. Result suggests that age of MFIs negatively moderate the relationship between GLP and sustainability and is statistically significant at 1 percent.

The results are in line with the life cycle theory which opines that as MFIs get mature, their portfolio quality deteriorated. The deterioration in portfolio quality may be due to the disbursement of multiple loans to an individual or household. The repetition of the loan to the same borrower or multiple borrowers from the same family with a single earning source represents negative developments for the poor and society at large as the system become biased towards borrowers with a track record rather serve new borrowers. Additionally, when repeated loans are provided to a family with a single earning source, the risk of loan default increases which impact the sustainability of MFI. Moreover, when significantly large loans are taken out by a few borrowers, access for potential new borrowers from the poorest of the poor becomes low when loan reserves reach exhaustion. Thus, multiple borrowing may also be a drain in outreach to the poor which negatively affect sustainability.

4.3.7 Estimation Results-Moderating Effect of Size

Size of MFIs measured by total assets (LNTA) is used in this study to examine the moderating effect of size on the relationship between profitability, portfolio quality, productivity, efficiency, liability management, gross loan portfolio and sustainability of

MFIs. Moderated multiple regression analysis using a fixed effect model is done and the results are presented in table 4.17. Since the data shows the autocorrelation, White Cross-section with GLS estimation is used to tackle the problem. Model 1 in Table 4.17 tests the relationship among independent variable, moderator and dependent variable. Size of MFIs has a negative insignificant relationship with the sustainability of MFIs in Pakistan. Results are suggestive of the fact that MFIs history variables entailing scaling up effects are not very important in terms of MFIs financial well-being. These results contrast with the study of Cull et al (2007). The possible reason could be that the data for size variable does not indicate enough variation to significantly impact the sustainability of MFIs when sample include different type of MFIs. The results of this study are in line with Hartarska (2005), and Kar and Swain (2014b) for 71 countries. Furthermore, the estimation with the interaction effect of LNTA on the relationship of ROA, ROE, PAR>30, BPSM, OER, DER, and GLP with MFIs sustainability using SI are presented in the subsequent models.

Table 4.17 shows the interaction effect of LNTA on the relationship between the return on asset and sustainability in Model 2. As shown in the table, F-statistics of the model is significant. R^2 change in model 2 is 0.023, which shows that LNTA is an interaction variable. The table also shows that the inclusion of LNTA on the relations of ROA and SI has significant results. The interaction term ROA*LNTA has a positive coefficient value of 1.03 and is strongly significant at 1 percent. Model 3 shows the estimation results of the interaction effect of size on the relationship between ROE and dependent variable. As shown in Table 4.17, the F-statistics of the model is significant, and change in R^2 value of 0.0001 indicates that the interaction term is significant. The coefficient value of 0.007 is positive, but the relationship is statistically insignificant.

Model 4 in Table 4.17 presents the interaction effect of LNTA on the relationship of the portfolio at risk and SI. It is observed from the table that F-statistics of the model is significant. R^2 change of the model has a value of 0.00002 which confirms the interaction effect of LNTA. The coefficient value for PAR>30*LNTA is -0.034, indicating a negative relationship and is statistically not significant even at 10 percent.

As shown in table 4.17, Model 5 shows the interaction of LNTA on the relationship of borrower per staff member and SI. The F-statistics shows that the overall model is significant. Change in R^2 of the model has an independent variable, interaction variable, and interaction term has a value of 0.005, indicating that the interaction variable is significant. The statistical values of BPSM*LNTA show that results are positively significant at 10 percent.

The interaction of LNTA on the relationship between the operating expense ratio and sustainability is presented in Model 6 of table 4.17. The F-statistics and change in R^2 value show that the overall model and interaction variable are significant. The coefficient of OER*LNTA is positive and has a value of 0.022. The p-value shows that the interaction effect of LNTA has a statistically insignificant effect on the relationship between OER and SSI.

Model 7 in Table 4.17 presents the interaction effect of LNTA on the relationship of debt to equity ratio and SI. It is observed from the table that F-statistics of the model is significant. R^2 change of the model confirms the interaction effect of LNTA. The coefficient value for DER*LNTA is statistically insignificant. As presented in table 4.17,

F-statistics for model 8 (interaction of LNGLP and LNTA) shows that the overall model is significant with a change in R^2 value of 0.003. The coefficient value for LNGLP*LNTA is 0.017 and is not significant even at 10 percent.

Table 4.16

Estimation Results-Interaction of MFIs size

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
ROA	5.995***	-6.467**	5.998***	5.996***	5.993***	6.007*	5.994*	5.941***
	(0.000)	(0.014)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROE	0.061**	0.074**	-0.037	0.062**	0.068**	0.060*	0.061*	0.068**
	(0.034)	(0.029)	(0.888)	(0.037)	(0.024)	(0.057)	(0.065)	(0.028)
PAR>30	-0.758	-0.760	-0.761	-0.334	-0.814	-0.760	-0.757	-0.816
	(0.203)	(0.195)	(0.202)	(0.935)	(0.158)	(0.205)	(0.208)	(0.162)
BPSM	0.0007	0.0007	0.0008	0.0008	-0.007	0.0008	0.0007	0.0008
	(0.209)	(0.238)	(0.207)	(0.235)	(0.130)	(0.205)	(0.212)	(0.196)
OER	0.101	0.233	0.089	0.106	0.114	-0.158	0.101	-0.015
	(0.777)	(0.562)	(0.798)	(0.782)	(0.749)	(0.857)	(0.779)	(0.964)
DER	0.001	0.0005	0.0009	0.001	0.001	0.001	-0.001	0.001
	(0.773)	(0.907)	(0.839)	(0.773)	(0.769)	(0.771)	(0.935)	(0.783)
LNGLP	0.116	0.095	0.115	0.114	0.105	0.115	0.116	-0.131
	(0.187)	(0.244)	(0.192)	(0.231)	(0.213)	(0.189)	(0.198)	(0.501)
LNTA	-0.064	-0.048	-0.065	-0.061	-0.139*	-0.067	-0.065	-0.292*
	(0.487)	(0.590)	(0.482)	(0.564)	(0.090)	(0.456)	(0.499)	(0.070)
RAO*LNTA	-	1.032***	-	-	-	-	-	-
		(0.000)						
ROE*LNTA	-	-	0.007	-	-	-	-	-
			(0.710)					
PAR>30*LNTA	-	-	-	-0.034	-	-	-	-
				(0.900)				
BPSM*LNTA	-	-	-	-	0.0006*	-	-	-
					(0.098)			
OER*LNTA	-	-	-	-	-	0.022	-	-
						(0.744)		
DER*LNTA	-	-	-	-	-	-	0.0001	-
							(0.879)	
LNGLP*LNTA	-	-	-	-	-	-	-	0.017
								(0.130)
R^2	0.635	0.659	0.635	0.635	0.640	0.635	0.635	0.638
Adjusted R^2	0.610	0.634	0.609	0.609	0.614	0.609	0.609	0.612
Change in R^2	-	0.024	0.0001	0.00002	0.005	0.00005	0.00007	0.003
F-statistic	26.108***	27.273***	24.574***	24.563***	25.104***	24.567***	24.561***	24.903***

Note: ***, **, * shows significance at 1%, 5% and 10% respectively

The results obtained from Table 4.17 provide a decision on the hypothesis of the influence of size on the relationship of ROA, ROE, PAR>30, BPSM, OER, DER, and LNGLP on the sustainability of MFIs and are presented in Table 4.18. Column three of Table 4.18 shows the decision of acceptance and rejection of these hypothesis.

Table 4.17
Hypothesis findings

Sr.no	Hypothesis	Decision
Hypothesis 15	Size of MFIs has a moderating effect on the relationship between profitability (ROA) and sustainability	Supported (significant at 1%)
Hypothesis 16	Size of MFIs has a moderating effect on the relationship between profitability (ROE) and sustainability	Not Supported
Hypothesis 17	Size of MFIs moderates the relationship between portfolio quality (PAR>30 days) and sustainability	Not Supported
Hypothesis 18	Size of MFIs moderates the relationship between productivity (BPSM) and sustainability	Supported (significant at 10%)
Hypothesis 19	Size of MFIs moderates the relationship between efficiency (OER) and sustainability	Not Supported
Hypothesis 20	Size of MFIs moderates the relationship between liability management (DER) and sustainability	Not Supported
Hypothesis 21	Size of MFIs moderates the relationship between GLP and sustainability	Not Supported

4.3.8 Discussion on the results of moderating effect of Size

This section presents and discusses the findings regarding the interaction of size on the relationship of profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio variables on the sustainability (measured using sustainability index) of MFIs. Following is the variable wise discussion of the results.

4.3.8.1 Moderating effect of Size on the relationship between Profitability (ROA) and Sustainability

The current study hypothesized that the size of MFIs has a moderating effect on the relationship between ROA and sustainability. Regression result suggests that our hypothesis is accepted as interaction term ROA*LNTA has a strong positive significant relationship with the sustainability of MFIs in Pakistan at a significance level of 1 percent.

The reason can be attributed to the ability of larger MFIs to reduce the costs from economies of scale. Another possible explanation for this positive relationship is that larger MFIs may use more sophisticated technologies (i.e. advanced management information systems, teller machines, online transactions, mobile banking) and has the ability to diversify products and services (i.e. savings mobilization, remittance, insurance, leasing) through a well-established network of branches which help them to improve the financial inclusion in a more cost-effective way, compared to smaller MFIs that depend on time and labor consuming outdated methods. This finding could also be since large MFIs become large because repeat borrowers tend to take increasingly larger loans. Hence, the client creditworthiness is well known to the MFI, requiring less screening cost per loan and much less per dollar of the outstanding loan portfolio. The larger loan is a more profitable product than the past smaller one, as a higher income is received and cost per dollar lent are reduced (Wijesiri *et al.*, 2017). Conversely, information asymmetry between a larger MFIs and its clients could be very low, as larger firms have higher social awareness that eventually leads to reduced agency costs (Nhung & Okuda, 2015). In general, this finding is in line with the life cycle theory which argues that small financial institutions are more likely to fail.

4.3.8.2 Moderating effect of Size on the relationship between Profitability (ROE) and Sustainability

The hypothesis for the current study that size of MFIs moderates the relationship between ROE and sustainability is rejected. This implies that the relationship between ROE and sustainability for MFIs in Pakistan is independent of its size.

The possible reason for these results may be that the majority of MFIs in Pakistan are non-commercial institutions which are still dependent on subsidies and donor funds. The culture in these institutions may be so mission-oriented that owners and management have a fear that private, for-profit investors will cause the institution to cease serving the poor effectively. Due to their unregulated structures, they are unable to develop their equity base. As for the size of MFIs increase, this implies that their asset base increases, not the equity base. Increase in assets does not necessarily imply the increase in equity of MFIs. Large MFIs may be efficient in managing their asset to expand their operations and increase cost-effectiveness. Therefore, the impact of return on equity does not have a significant contribution on the sustainability of MFIs. Additionally, large MFIs in Pakistan are still unable to attract funds from commercial investors as none of these institutions and banks are listed on any of the stock exchange, neither they are gone public. Thus, they have restricted equities and are more dependent on funds generated through asset borrowings. This could be the possible reason for the insignificant moderating effect of size on the relationship between ROE and sustainability of MFIs.

4.3.8.3 Moderating effect of Size the relationship between Portfolio Quality (PAR>30 days) and Sustainability

Regression results suggest that size of MFIs does not moderate the relationship between portfolio quality and sustainability of MFIs in Pakistan.

PAR > 30 days for the majority of MFIs in Pakistan remained low despite having been affected by natural disasters like the earthquake in 2005 and floods in 2010 & 2011, the adverse security situation in the country in recent years and delinquency crisis in Punjab in 2008 (Basharat *et al.*, 2014). Results of the current study further suggest that MFIs size does not matter much for non-performing loans. Instead, higher repayment rates by MFIs borrowers can be attributed to different performance functions such as borrower screening and follow-up on the loan, or just a lower quality of new borrowers (Chakravarty & Pylypiv, 2015). High repayment rates occur either by good portfolio management or by rapid expansion into new areas. The lack of significance of any size-portfolio at-risk relationship with sustainability suggests that no significant advantages are accruing to larger microfinance institutions in terms of the asset. Additionally, Gonzalez (2007b) found that larger MFIs are less risky than smaller MFIs. These could be the possible explanations for the insignificant moderating effect of size on the relationship between portfolio quality and sustainability of MFIs.

4.3.8.4 Moderating effect of Size on the relationship between Productivity (BPSM) and Sustainability

This study hypothesized that size moderates the relationship between staff productivity and sustainability of MFIs. The results of the regression model support the above hypothesis. Results suggest that the interaction term LNTA*BPSM is statistically significant at 10 percent and have a weak positive relationship with the sustainability of MFI.

Assets like vehicles enabled credit officers to handle more borrowers thus increasing returns per officer (Sekabira, 2013), consistent with Bogan *et al.* (2007). The result for the borrowers per staff member indicator (BPSM) is sensitive to the addition of the asset size variable in the model (Nwachukwu, 2014). This outcome highlights the link between asset size and productivity. The inference is that MFIs with a sufficiently large asset base have the ability to fund the capital investment in the training, technology, and equipment needed to maximize services. Thus, highly productive staff improves the portfolio quality with a better understanding of the needs of the poor borrowers. This may be the possible reason that the size of MFIs moderates the relationship between staff productivity and sustainability of MFIs in Pakistan.

4.3.8.5 Moderating effect of Size on the relationship between Efficiency (OER) and Sustainability

This study hypothesized that the size of MFIs moderates the relationship between efficiency and sustainability. Regression results suggest that the interaction effect of size and efficiency have an insignificant relationship with sustainability.

As microfinance institutions are not standardized in size and complexity, the suitability of technology integration should also be considered accordingly to suit each organization needs. These differences include the volume of transactions, regulatory environment, infrastructure and overall readiness for change, as well as the resources available. The advanced systems help MFIs in running business, serving clients, providing differential products and services to gain competitive advantage. Additionally, the implementation of an effective core system has helped MFIs with the increment of transparency and the improvement of business quality management. The efficient use of technology has reduced the cost of operations and help MFIs to increase outreach. Additionally, the regulatory authorities and State Bank of Pakistan have ensured the use of advanced technology in all MFIs, irrespective of their size and legal structure.

Moreover, MFIs in Pakistan are providing ATM cards to the borrowers who reduce cash and cheque keeping burden. This has helped them to reduce the burden on staff, and efficiently utilize their resources in development activities. The same has been highlighted by Rozzani *et al.* (2013) that means of electronic payment had been increasingly helpful in tackling issues of inflation, that makes cash transactions a burden to the MFIs as well as

recipients, and resultantly increment the cost of cash administration and management. Since MFIs in Pakistan are using advanced technologies with increased efficiency, irrespective of their size, it might be the reason for an insignificant effect of size on the relationship between operating expense ratio and sustainability of MFIs.

4.3.8.6 Moderating effect of Size on the relationship between Liability Management (DER) and Sustainability

The hypothesis developed in this study is that size moderates the relationship between DER and sustainability of MFIs in Pakistan. The regression results show that the size of MFIs does not moderate the relationship between DER and sustainability of MFI.

The possible reason could be that debt financing is simply not dependable enough. Loans impose liquidity problems on the financial institution as they inevitably come due in sizable blocks and either need to be refinanced by new loans or paid off by liquidating assets. Small, unregulated MFIs typically have the least ability to raise debt financing. They often begin operations with a grant from a development organization and expand via new donations and retained earnings. On the other hand, larger, unregulated MFIs have a greater number of portfolio funding options than smaller institutions. Mature, regulated MFIs usually have well-developed funding strategies based on longtime funders and strong deposit operations. These institutions, unlike smaller MFIs, tend to manage liabilities to maximize profitability and minimize liquidity risk actively. However, due to high agency cost and debt covenants, MFIs may avoid the use of external funding or debt. Therefore, in Pakistan, large MFIs prefer accepting deposits instead of relying on external debt.

According to the Pakistan Microfinance Review report, MFIs in Pakistan with capital above PKR 1 billion can also issue Certificate of Deposits (CODs) to raise funds (Pakistan Microfinance Network, 2015b). Additionally, for large MFIs percentage of the gross loan portfolio (GLP) financed against gold ranges from 20 percent to 55 percent (Pakistan Microfinance Network, 2015b). Moreover, Hartarska (2009) argued that the level of debt ratio does not impact performance, perhaps because the capital structure is less important in MFIs where donors and other providers of funds are flexible and could offer support in terms of both equity and loans. Another possible reason could be that large MFIs usually manage to reduce their operating cost using advanced technology and product diversification. These revenues may be used for future investment to increase their loan portfolio. This would help MFIs to increase their outreach, and they become less dependent on external funds and equity borrowings.

4.3.8.7 Moderating effect of Size on the relationship between GLP and Sustainability

Results of the current study suggest that size of MFIs does not moderate the relationship between GLP and sustainability. This implies that the relationship between gross loan portfolio and sustainability is independent of the size of MFIs. Increase in size in terms of a number of assets does not influence the relationship between GLP and sustainability.

On the flip side, results show that the direct relationship between GLP and sustainability is significant at 1 percent. However, results presented in Table 4.17 shows that size of MFIs does not moderate the relationship between GLP and sustainability. According to Pakistan Microfinance Network (2015b), MFIs in Pakistan have large numbers of returning clients

among its active borrowers. This is particularly true as they are upscaling loan sizes to cater to the funding needs of micro-enterprises. Another reason can be the realization among practitioners that the loan sizes are unnecessarily conservative and increasing loan sizes is not related to catering for lower income segments. This is also true for players in Pakistan as several MFIs have lately recalibrated their loan sizes to keep up with the requirements of their clients and inflation. This implies that MFIs in Pakistan increase their asset base, but they are unable to increase their outreach. This may be the possible reason for the insignificant moderating effect of size on the relationship between GLP and sustainability. Henceforth, the increase in the gross loan portfolio for MFIs in Pakistan is disproportionate with the increase in the size of MFIs when measured using the asset.

4.4 Chapter Summary

The chapter starts with a sample of the study followed by measuring sustainability using Principal Component Analysis. Based on the scores obtained from the index, descriptive statistics are provided for the sustainability of MFIs. Later, descriptive statistics for the independent variable used in this study are provided. These statistics provide mean, median, maximum and standard deviation of the variables for the study period from 2006-2015. Also, multiple regression analysis is done to test the effect of the independent variable on the sustainability of MFIs, obtained using PCA. Before the regression analysis, several diagnostics are performed to test the data for BLUE assumptions. Data for MFIs in Pakistan show the problem of heteroskedasticity and autocorrelation. GLS estimation was used to make data consistent with heteroskedasticity and autocorrelation. The estimation result for GLS shows that return on asset, return on equity, staff productivity and gross loan

portfolio are the key determinants of sustainability of MFIs in Pakistan. Later, the moderated regression analysis is done to study the moderating effect of age and size on the relationship between ROA, ROE, PAR>30, BPSM, OER DER, and GLP and sustainability of MFIs in Pakistan. Regression result shows that age moderates the relationship between ROE, PAR>30, BPSM, DER and GLP, and sustainability. Additionally, the size of MFIs moderates the relationship between ROA, BPSM, and sustainability of MFIs.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter starts with the recapitulation of findings in section 5.2. In the next section, implications of the findings for MFIs managers, policy makers, and academicians are discussed. Followed by implications are the key contributions of this study in the existing knowledge related to MFIs sustainability. Later, limitations and recommendations for future studies are discussed. The last section presents a summary of this chapter.

5.2 Recapitulation of Findings

Microfinance institutions have emerged as a flexible solution to provide finance to the poor people. This study aims to develop the sustainability index for MFIs in Pakistan, identify the determinants of sustainability, and determine the moderating effect of age and size on the relationship between profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on the sustainability of MFIs in Pakistan. To achieve these objectives, the study formulated 21 hypotheses.

The measure of sustainability developed in this study posits equal emphasis by considering the financial (financial and operational self-sufficiency) and outreach (depth and breadth) measures simultaneously. Using Principal Component Analysis, weights are assigned to all the four indicators of sustainability. The weight for FSS, OSS, ALPB and NAB are 0.6643, 0.6607, -0.1905 and 0.2931 respectively. The positive values for weights indicate

that increase in FSS, OSS, NAB increase the sustainability scores of MFIs, whereas, an increase in ALPB decrease the sustainability score of MFIs. Furthermore, these weights are then assigned to individual indicators, and sustainability score of MFIs in Pakistan are obtained for the year 2006-2015. It is observed from that score for SI ranges from -2.295 to 3.513. The inclination of score towards the positive values designates MFIs with higher sustainability.

The regression result suggests that profitability has a significant relationship with the sustainability of MFIs in Pakistan. Return on asset and return on equity are the two proxies used to measure the profitability. Both ROA and ROE have a significant relationship with the sustainability of MFI. This implies that MFIs need to focus on generating revenues by efficiently using its assets and equities to achieve sustainability. Moreover, the productivity of MFIs measured by the borrower per staff member has a significant relationship with sustainability. Additionally, GLP has a strong positive significant relationship with sustainability. This implies that MFIs in Pakistan need to increase its GLP to increase their sustainability. On the flip side, regression result suggests that DER have an insignificant relationship with the sustainability of MFI. Result suggest that the sustainability of MFIs in Pakistan is not affected by their DER. Moreover, regression results presented in Table 4.13 show that portfolio quality, measured by PAR, and efficiency, measured by OER, have an insignificant relationship with sustainability. Table 4.14 shows that hypothesis 1 and 7 are strongly supported at a significance level of 1 percent. Hypothesis 2 and 4 are also supported at a significance level of 5 percent. However, Table 4.14 shows that hypothesis 3, 5 and 6 were not supported significantly.

In terms of profitability, the age of MFIs moderates the relationship between ROE and sustainability. The interaction of ROE*LNAGE in MFIs has a significant relationship with sustainability. Nevertheless, the regression result suggests that age does not moderate the relationship between ROA and sustainability. The interaction term ROA*LNAGE has an insignificant relationship with the sustainability of MFI. Furthermore, results in Table 4.15 shows that the interaction term PAR>30*LNAGE has a strong significant relationship with the sustainability of MFI. Moreover, the significant relationship between the interaction term BPSM*LNAGE with sustainability shows that age of MFIs weakly moderates the relationship between productivity and sustainability. Furthermore, the age of MFIs moderates the relationship between liability management and sustainability. Result in Table 4.15 shows that interaction term DER*LNAGE and LNGLP*LNAGE have a significant relationship with the sustainability of MFI. On the flip side, the regression result shows that age of MFIs does not moderate the relationship between efficiency and sustainability. Table 4.16 present the result for the hypothesis accepted or rejected for the moderating effect of age on the relationship between profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on sustainability. Table 4.16 shows that hypothesis 10 and 14 are strongly supported with a significance level of 1 percent. Hypothesis 9 and 13 are supported at a significance level of 5 percent. Moreover, hypothesis 11 is weekly supported at a significant level of 10 percent and hypothesis 8 and 12 are not supported.

Size of MFIs measured by total assets moderates the relationship between profitability and sustainability. The interaction term ROA*LNTA have a strong significant relationship with the sustainability of MFIs. This implies that as MFIs increase their asset base, they need to

focus on the revenues generated by using these assets to have higher sustainability level. On the other hand, interaction term BPSM*LNTA have a significant relationship with the sustainability of MFIs. Additionally, regression result suggests that size of MFIs does not moderate the relationship between return on equity, portfolio quality, efficiency, and liability management and sustainability. Table 4.18 present the result for the hypothesis accepted or rejected for the moderating effect of size on the relationship between profitability, portfolio quality, productivity, efficiency, liability management and gross loan portfolio on sustainability. Column 3 in Table 4.18 provide decisions for the hypothesis supported or not supported in this study. Hypothesis 15 for the current study is strongly supported at a significance level of 1 percent, and hypothesis 18 is supported at a significance level of 10 percent. Table 4.18 further show that hypothesis 16, 17, 19, 20 and 21 are not supported.

5.3 Implications of Findings

The empirical findings of this study have implications for various stakeholders such as managers, policy makers, and academicians. These implications are discussed below.

5.3.1 Implications for Managers

In accordance with the findings of the current study, few managerial implications of the results are discussed in this section. This study provides a better insight into the sustainability of MFIs based on double bottom line principle. A composite measure of sustainability developed in this study is helpful for managers to evaluate MFIs in pursuit of their efforts to achieve the double bottom line.

This research is helpful for managers of MFIs in Pakistan in understanding the important factors that are affecting sustainability. The findings of this study suggest that profitability is the most significant contributor to sustainability. MFIs in Pakistan need to focus on their ROA as they have the highest coefficient value and the relationship is strongly significant at 1 percent. Additionally, the MFIs manager need to focus on ROE to achieve higher sustainability. This could be done by reducing their operating and financial costs through the adaptation of new technologies and product innovations.

Additionally, MFIs need to posit strict monitoring to late payments, vigorous credit screening and enhance their staff productivity. The findings of the study suggest that MFIs managers need to enhance staff productivity to achieve sustainability. Since MFIs provide collateral-free loans with higher chances of loan default, therefore, highly productive and vigilant staff may help reduce the cost of loan default and ensure a timely repayment. MFIs need to focus on their staff by providing on the field and off field training to ensure their understanding of the compliance and regulations and keep them motivated and goal oriented by increasing their remunerations. Findings further imply that MFIs managers need to focus on increasing their gross loan portfolio as they impact sustainability.

The findings further suggest that MFIs that spend more year in the market are able to achieve higher sustainability. As MFIs get older, managers need to focus on the efficient utilization of their equities, as the findings of the study suggest that with age, ROE negatively impact sustainability. Moreover, MFIs managers need to improve their lending methods through years of experimentations and improved technology and must have a better understanding of the market and customers. Over the years, MFIs managers need to

manage their portfolio quality, have high staff productivity, reconsider their focus on debt borrowings against their equity and increase in their loan portfolio to have higher sustainability. Another managerial implication is that as MFIs get older, return on asset no longer affects the sustainability of MFIs in Pakistan. However, with the increase in assets of the firm, MFIs managers need to focus on the ROA and BPSM to achieve higher sustainability.

5.3.2 Implications for Policy Makers

The findings of this study are also helpful for the policymakers and regulatory authorities such as the State Bank of Pakistan (SBP), Security Exchange Commission of Pakistan (SECP), and Pakistan Microfinance Network, and to develop the policies that facilitate the MFIs to achieve sustainability. Sustainability for MFIs in Pakistan is measured using a financial indicator of FSS and OSS (Pakistan Microfinance Network, 2015b). However, the findings of this study suggest that sustainability is a multi-dimensional construct based on the double bottom line. SBP should formulate comprehensive operational guidelines and code of conduct with effective fiscal power to supervise and monitor the microfinance sector to ensure that the poor people are always preferred in receiving microfinance services.

MFIs core focus is to increase outreach and reach maximum poor people and tend not to increase their loan size. Regulatory authorities must keenly observe the loan size as large loans may increase the risk of default as they are not collateral supported and effect

sustainability. Additionally, an increase in loan size deviates MFIs from their core purpose of reaching very poor people and diffusing the original mission of MFIs.

The study recommends that policymakers should focus more on improving productivity and adopting cost-effective and efficient strategies. In Pakistan, SBP posits strict assurance to protect staff members of commercial banks and other regulated institutions. The policy maker should also ensure strong policies for MFIs staff by providing annual leaves, health insurance, retirement policies, and minimum wage benefits. Policymakers must ensure staff appraisal systems, incentivizing hard-working staff, stepping up monitoring to improve on loan collections and adaptation of appropriate information communication technologies.

The policymakers in Pakistan need to focus on improving the credit reporting framework. This may help MFIs to improve their portfolio qualities and reduce the number of defaults. This may be done by avoiding multiple borrowing leading to over-indebtedness, moral hazard and adverse selection in the sector. This may be achieved by ensuring that MFIs become a registered member of the Microfinance Credit Information Bureau to get timely excess of borrower credit history. Additionally, the policy makers have initiated financial inclusion strategies to help MFIs to obtain commercial debt. However, findings of the current study suggest that over the years MFIs in Pakistan need to be less dependent on commercial funding as they negatively impact sustainability. Therefore, policymakers need to reconsider the financial inclusion strategy to achieve a double bottom line. Additionally, mature MFIs have lower portfolio quality which may be enhanced by

introducing policies or system that may help MFIs in overcoming the issue of multiple borrowing.

5.3.3 Implications for Academicians and Researchers

The findings of this study suggest that the area of sustainability in MFIs is still open for further investigation by the academicians and finance researchers. The findings of this study hold the implications for academicians and finance researchers in terms of further investigation in the field of sustainability using double bottom line, by applying different estimation techniques, using longer balanced and unbalanced panel datasets, and conducting regional investigations.

To the research community, it is important to recognize that evaluating the impact of microfinance programs is nothing less than complex. Existing methods have been criticized one way or the other, thus questioning the reliability of results. Policies are often hinged on these results, and if adequate methods do not emerge to deal with luring problems, wrong policies may be implemented. Generally, there is a need for more and better research that focuses on the impact of microfinance, and the other dimensions of microfinance. However, such studies need to be based on sound research methodologies.

5.4 Contributions

The study contributes to the body of knowledge in the following ways

Firstly, Sustainability measurement of MFIs has become a serious issue over the past years. This study makes a unique attempt to quantify (measure) the multidimensional construct of sustainability by considering the diverse dimensions of this construct. This study posits that as MFIs seek to reach as many poor people as possible, this can be done in a financially sustainable manner. In this regard, this study takes a more integral view of sustainability by going beyond purely financial dimensions and integrating outreach dimensions as well. By doing so, this study is able to take a balanced and holistic approach to study the sustainability of MFIs in Pakistan under double bottom line principle. When measuring sustainability, the study takes into account the financial sustainability of the MFIs (captured by operational self-sufficiency ratio, financial self-sufficiency ratio) and places equivalent emphasis on outreach factors such as NAB (reflecting the breadth of outreach) and the average loan size per borrower (reflective of the depth of outreach). The approach used in this paper considers the complexity of MFIs sustainability problem by considering four different indicators and proposes a composite index of sustainability, referred to as the Sustainability Index. Using the Principal Component analysis, sustainability scores are obtained.

Secondly, this study is a novel attempt, as per the researcher limited knowledge, to identify the determinants for the sustainability of MFIs in Pakistan. The determinants of profitability, portfolio quality, productivity, efficiency and liability management have not been tested in previous studies for MFIs in Pakistan. By measuring sustainability using a double bottom line, this study is unique to identify that profitability measured by ROA and ROE, staff productivity and gross loan portfolio are the key determinants of sustainability.

Thirdly, the application of Life Cycle Theory has previously been used in MFIs literature for the understanding of the capital structure and firm performance (Bogan, 2012; DeSousa-Shields & Frankiewicz, 2004). This study is unique to apply LCT in understanding how changing life cycle of firm influence the performance of MFI.

Fourthly, this study is a novel attempt to study the moderating effect of age of MFIs on the relationship between performance indicators and sustainability of MFIs in Pakistan. Fifthly, this study is also a novel attempt to study the moderating effect of size of MFIs on the relationship between performance indicators and sustainability of MFIs in Pakistan. Sixthly, this study is using the latest dataset (2006-2015) to understand the dynamics for the sustainability of MFIs in Pakistan. The database used to extract company-specific data is Pakistan Microfinance Network, annual reports, and Mix Market.

5.5 Limitations and Recommendations for Future Research

Apart from its contribution to the existing knowledge of MFI, this study has certain limitations and highlight future research perspectives.

5.5.1 Limitations

The current study has several limitations which are discussed below;

1) The current study uses unbalance panel data of microfinance institutions in Pakistan. The total number of MFIs in our sample is 38 whose data has been taken from the period 2006-2015. The total number of MFIs reporting their data to PMN is 50, but this study excludes the MFIs which have reported their data for less than

3 years. Resultantly, 38 MFIs with 273 firm-year observations have been used in this study. Use of panel data with more MFIs and firm-year observations may possibly affect the findings of the study.

2) The sustainability index developed in this study using principal component analysis is specifically for MFIs in Pakistan only by using data set for ten years.
3) This study used PCA for index development and fixed effect for regression analysis. Hence the results cannot be generalized when estimation is done using other techniques. This implies that there is a further scope of improvement in the results.

5.5.2 Recommendations for Future Studies

Based on the findings and limitations of the scope for the current study, the study has several recommendations for future studies.

1) The model of sustainability Index for microfinance institutions is more comprehensive and may be used to create a sustainability index for various countries and help the regulator identify the strong and weak areas of the sector. Having access to sustainability information may reduce some of the transaction uncertainties. This model may be considered as one more step in the process of the emergence of the microfinance standards.
2) Future research may determine the sustainability score of MFIs by assigning weights to each criterion through Rating agencies or experts. Moreover, the scope of the study may be enhanced by evaluating sustainability score across countries

and comparing them. Application of this index for studies in different countries may replace the average loan balance with average loan balance divided by per capita gross national income to consider the effect of change in the economic environment.

3) To better understand the determinants of sustainability of MFIs in Pakistan, it is important to shift the focus from an empirical study based on secondary data to one based on primary data (survey). Survey-based study is likely to provide better insights into this important aspect of microfinancing in Pakistan and help managers, investors, shareholders, and policymakers to make informed decisions. This proposed survey-based study may be helpful for the researchers to improve the theoretical models of MFIs performance decisions.
4) A cross-country study, including the sub-samples of both developing and developed countries, using additional country-specific variables, is at this moment proposed for future research.
5) Hence, future studies using different proxies of the same variables and adding some other variables may provide a better understanding of the determinants of sustainability. Besides the relevant and significant variables used within the study, the combination of these factors with other parameters that Mix Market is continuously collecting would be important to find additional factors leading to financial sustainability which have not been addressed in this study to inform all the relevant stakeholders. Additionally, the sample size for the study may also be increased for robust results.

6) Empirical studies made on a significant amount of institutions regarding the effects on the MFIs sustainability created by group/individual and rural/urban-based lending would be a step forward in analyzing the factors that can make microfinance work in a sustainable way.
7) Furthermore, the addition of macroeconomic, legislative or cultural variables could explain the reasons for the difference in performance among regions.
8) Finally, besides the importance of the data provided by Mix Market, it would also be valuable to study the effect of the pricing of those MFIs. Mix Market does not provide data regarding the interest rates charged by microfinance institutions to their clients apart from an approximate figure represented by the yield on gross portfolio. This fundamental gap in data availability is recently filled by an organization called MF Transparency which is slowly providing data regarding the pricing applied by institutions to their customers. The combination of data would be a great asset for future researchers to identify whether an important correlation could be found between interest rates and long-term sustainability.

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